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ABSTRACT

The objectives of a three-year comprehensive aerospace education program at Kenston High School, Chagrin Falls, Ohio, funded under Title III ESEA, were to provide marketable skills for non-College-bound students as well as counseling for the student planning on college or technical school education in the aviation field. Students also were taught skills of other disciplines such as math, geography, cartography, and science under real job-training conditions. The entire three-year program in aerospace education included three year-long courses, totaling three units of high school credit and was made available to all interested tenth, eleventh, and twelfth grade students. The program was supplemented with speakers, audio-visuals, and field trips; students in each course were required to do an independent study project. An evaluation of the project reflects aviation student profiles, class attendance, course interest, future vocational goals of students, and interest-aptitude survey. Other aspects covered are the impact of Title III, cooperating agencies, information dissemination, and costs. More than half of this document is devoted to appendixes describing student aviation projects and reports, curriculum guides of courses, students survey, photographs, evaluation samples (OVIS, Strong, and GATB), and phase-in report. (Author/EA)

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KENSTON

AEROSPACE

TITLE III ESEA

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Chagrin Falls, Ohio

CE 000 870

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SUMMARY

In 1968, Kenston High School, located in the Southeastern Suburbs initiated a one year basic Aviation course. It proved to be successful with 90 out of 750 students enrolling in the course. That year, we applied for Federal funding under Title III of the Elementary & Secondary Education Act. We won the grant and proceeded to develop a three-year Comprehensive Aerospace Education program as outlined on page 12 of this report. Our objectives were to provide a marketable skill for non-college bound students as well as counseling for the student who wished to go on to college or technical school in the Aviation field. The students were also taught the skills of other disciplines such as math, geography, cartography, science, etc, under real job training conditions. Upon completing our final year of the three year grant, we have been quite successful in our objectives. We are not only giving the student an excellent insight into the Aerospace Industry, but also aiding 12 to 15 students per year decide on the Aerospace field as their chosen career. Approximately 7 students are choosing Aviation as their vocation right out of high school in areas such as aircraft manufacturing, airport maintenance, ticketing & reservation, etc., while 12 are continuing their education at either the technical or college level. During the

three year program, we have had 332 students enrolled in all three courses. Kenston's program has also stimulated interest in Aerospace education in nearby school districts. Four high schools within a five mile radius of ours now have a basic Aviation course. Also, of the 92 students who enrolled in Aviation for three years, 42 have soloed and 12 have received their private pilot's license.

PART I

EVALUATION OF PROJECT ACTIVITIES

Objective I A: To Develop a Three-year Vocationally-oriented Aerospace Program.

Kenston High School has developed a three-year sequential vocationally-oriented Aerospace course. A brief course description follows:

The entire three-year program in Aerospace Education will include three year-long courses, totaling three units of high school credit. This program is available to 10th, 11th, and 12th grade students.

AEROSPACE I is a basic or survey course to introduce and orient the student to the entire aerospace field. It should serve as an independent course for the student taking only this course, as well as the basic course for the student taking the entire three-year program. An orientation flight in both the Link Trainer and also a Cessna Sky Hawk is a part of this course.

AEROSPACE II will be divided into four nine-week units, Aero-Science, Aero-Math, Aero-Business, and Aviation in Our Culture. Each unit will be taught by a spacialist in that area. The overall purpose of this year's work will be to teach and apply the knowledge and principles of each of these disciplines as they relate to aerospace. An orientation flight in a glider and a biplane is part of this course.

AEROSPACE III Aerospace Technology will be the Applied Science of the series. It will consist of advanced ground school, leading to the FAA exam, and a semester of flight training (approximately 8 hours actual flight time) as a partial requirement for a pilot's license. Students will also be scheduled for approximately 8-10 hours of simulated flight time in the Link GAT I Trainer. It is planned that the D.C.T. and C.O.E. programs be coorinated with this course, permitting students to work in related jobs.

The entire Aerospace Program will be supplemented with speakers, audio visuals and field trips. Students in each course will also be required to do an independent study project.

Disposition of pupils are as follows:

Aerospace I (10th grade and up)

	70-71	71-72	72-73	3 yr. total	Percent
Male	33	63	37	133	74.3%
Female	10	17	19	46	25.7%
Totals	43	80	56	179	100.0%

Aerospace I is open to 10th, 11th, and 12th grade students. Over three years we have had 163 10th graders, 12 11th graders and 4 12th graders enrolled in the course.

In addition to having attained the status of a 10th grader or above, the only pre-requisite for enrolling in Aerospace I is interest. Our philosophy here is that in limiting the course to better students we would be missing a chance to help the average or poorer student find some direction. It is also our hope that each student will improve himself in other areas as well.

Aerospace II (11th grade and up)

	70-71	71-72	72-73	3 yr. total	Percent
Male	19	17	13	49	80.3%
Female	6	3	3	12	19.7%
Totals	25	20	16	61	100.0%

To enter Aerospace II each student must have completed Aerospace I and be either a 11th or 12th grader. During the program, all Aero II students were 11th graders.

For those students who cannot schedule the necessary courses during the academic year, we offer a course during Summer School to help meet Pre-requisites.

Aerospace III (12th graders)

	70-71	71-72	72-73	3 yr. total	Percent
Male	27	21	21	69	75.0%
Female	6	14	3	23	25.0%
Totals	33	35	24	92	100.0%

The following is the achievement data by course and unit.

AEROSPACE I

Unit I - Introduction to Aerospace

	3 yr. totals
Number of students	179
High	100
Low	23
Mean	77

Unit II - Aircraft in Flight

Number of students	179
High	98
Low	24
Mean	72

Unit III - Navigation and Weather

Number of students	179
High	92
Low	38
Mean	67

Unit IV - Power of Aircraft

Number of students	179
High	96
Low	20
Mean	65

Unit V - Airport, Airways & Electronics

Number of students	179
High	88
Low	30
Mean	70

Unit VI - Challenge of Aerospace Power (Economics)

Number of students	179
High	100
Low	24
Mean	77

Unit VII - Dawning Space Age

Number of students	179
High	96
Low	30
Mean	75

AEROSPACE II

Aerospace - Business (9wks) J. Burnett

Unit I - Manufacturing

Number of students	61
High	78
Low	24
Mean	51

Unit II - Transportation

Number of students	61
High	68
Low	28
Mean	49

Unit III - Aviation in Stock Market

Number of students	61
High	84
Low	20
Mean	68

Unit IV - General Aviation

Number of students	61
High	74
Low	21
Mean	58

Unit V - Cost Data (Airports & Aircraft)

Number of students	61
High	78
Low	18
Mean	64

Aerospace - Social Studies (9 weeks) Z. Gorby

Number of students	61
High	96
Low	60
Mean	84

Aero - Science (9 weeks) R. Mowrey

Number of students	61
High	92
Low	31
Mean	68

Aero - Math (9 weeks) G. Fenstermaker

Number of students	61
High	96
Low	32
Mean	66

AEROSPACE III
(Advanced Ground School & Flight Lab.)

Unit I - Pre-Flight Facts

Number of students	92
High	100
Low	34
Mean	78

Unit II - Instruments and Systems

Number of students	92
High	80
Low	20
Mean	67

Unit III - Weight and Balance

Number of students	92
High	100
Low	35
Mean	75

Unit IV - Meteorology

Number of students	92
High	90
Low	16
Mean	65

Unit V - Flight Computer

Number of students	92
High	96
Low	65
Mean	80

Unit VI - Aircraft Radio Communications

Number of students	92
High	96
Low	37
Mean	78

Unit VII - Navigation

Number of students	92
High	90
Low	46
Mean	78

Unit VIII - Radio Navigation

Number of students	92
High	82
Low	20
Mean	68

Unit IX - Federal Aviation Regulation

Number of students	92
High	88
Low	58
Mean	72

Unit X - Alcohol, Drugs & Flight Effects

Number of students	92
High	96
Low	48
Mean	82

Unit XI - Physiology of Flight

Number of students	92
High	98
Low	54
Mean	75

Unit XII - Maneuvers Course

Number of students	92
High	82
Low	30
Mean	64

Objective I B: Emphsis on individual study will be required of Aerospace II students.

Individual study was emphasized in Aerospace II with students working on some projects related to Aviation or Space. Written reports on their topics are kept in a file for those students or interested parties who would wish to preview them. Individual study projects have been expanded and are also required of Aerospace I and III students. A list of projects students may choose from is attached to this report. (see appendix A)

Objective I C: Some Aerospace III students will participate in Vocational oriented programs such as DCT and COE.

Twelve students 13% of the Aerospace III class over the past 3 years have been working in a Aviation related field. Ten as line boys and two as apprentice Aircraft and powerplant mechanics at a local airport.

Objective II: To employ the talents of four departments to relate their disciplines to Aerospace.

Teachers from four departments have been utilized to instruct the Aerospace II segment. The departments include Aerospace Math, Science, Business and Social Studies. The teachers instruct the students in these special areas as they relate to Aviation and Space. Staff involvement is as follows.

Aero-Business 9 weeks - 2 classes Jeanette Burnett (Business Dept.)

Hours planning	125
Hours teaching	63

Aero-Social Studies - 9 weeks - 2 classes - Zinn Gorby (Social Studies Dept.)

Hours planning 115
Hours teaching 63

Aero-Math - 18 weeks - 1 class - Gene Fenstermaker - (Math Dept.)

Hours planning 105
Hours teaching 63

Aero-Science - 18 weeks - 1 class - Robert Mowrey - (Physics Dept.)

Hours planning 107
Hours teaching 63

Objective III: To develop a detailed three-year program in the format for sophomores, juniors, and seniors.

(See Appendix B)

Objective IV: To make a course of study available to all interested parties.

In our own school system, mini-courses are available to students not already enrolled in the program to explain our goals, activities and basic requirements. Outside the school system refer to data in Part V on page 39 .

Objective V: Participants will show at the end of each year of Aerospace I, Aerospace II and Aerospace III:

1.) A change in increase by 10% improvement in attendance and punctuality. (Figure I) shows attendance by each 9 week periods for 1970-71 and 1971-72 and 1972-73.

FIGURE I ATTENDANCE

Absentees 1st 9 weeks

	1970-71	1971-72	1972-73
Aero I (10th)	42	37	120
Aero II (11th)	15	31	18
Aero III (12th)	11	38.5	34
Totals	68	106.5	172

Absentees 2nd 9 weeks

	1970-71	1971-72	1972-73
Aero I (10th)	85	110	164
Aero II (11th)	21.5	43	33
Aero III (12th)	40	88.5	63
Totals	146.5	241.5	260

Absentees 3rd 9 weeks

	1970-71	1971-72	1972-73
Aero I (10th)	60	87	225
Aero II (11th)	18	42	45
Aero III (12th)	25	28	50
Totals	103	157	320

Absentees 4th 9 weeks

	1970-71	1971-72	1972-73
Aero I (10th)	28	25	128
Aero II (11th)	32	38	35
Aero III (12th)	7	29	66
Totals	77	92	229
Yearly totals	394.5	596.5	981

Comment: Increase in absentees was due primarily to a flu epidemic during the winter months.

2.) A reduced drop-out rate of 50% (Comment on following data) (Figure II shows the drop-out rate for each 9 week periods for 1970-71, 1971-72, and 1972-73.)

FIGURE II

Drop-out rate for 1st 9 weeks

	1970-71	1971-72	1972-73
9th grade	1	0	1
10th grade	0	0	0
11th grade	0	0	0
12th grade	0	0	1
Totals	1	0	2

2nd 9 weeks

	1970-71	1971-72	1972-73
9th grade	2	1	1
10th grade	1	0	0
11th grade	0	1	0
12th grade	0	0	1
Totals	3	2	2

3rd 9 weeks

	1970-71	1971-72	1972-73
9th grade	0	0	0
10th grade	1	0	1
11th grade	0	0	0
12th grade	0	0	0
Totals	1	0	1

4th 9 weeks

	1970-71	1971-72	1972-73
9th grade	1	0	1
10th grade	0	0	0
11th grade	0	0	0
12th grade	0	1	1
Totals	1	1	2
Yearly Totals	6	3	7

Drop-out figures show 50% reduction during 1971-72 and a 70% increase in 1972-73. However, it should be noted that none of these drop-outs over the 3 year period were enrolled in Aerospace Education courses.

3.) A change in personal interest directed towards the Aviation field.

In a survey given to each student (See appendix C, page 80) we tried to determine to what extent students in an Aviation course would come out with interest and attitudes more favorable towards Aviation. In a study, "I Would Rather Be Flying", Dr. Traylor states:

"In education it has become appartent that frequently classes are designed to improve the prediction system by pumping information, understandings, habits, skills without being equally concerned with the affective or emotional concomitant of these experiences. It is not unlikely, for instance, that a student may very well "know how to factor quadratics" but he may also hate algebra. The person's "mathematics behavior" is going to be much more affected by his feelings about the mathematics rather than by his understandings and skills acquired.

In this sense our concern with measuring attitudes in the aviation classes is of great importance. One may very well learn a lot about aviation. One may, in fact, be able to identify certain components of airplanes, may have certain understandings about navigation, may have certain understandings about meterology and still dislike flying. Whether one decides to continue studying to get a pilot's license and then flys either avocationally or vocationally might be more contingent upon his attitudes about aviation than upon his understandings of aviation phenomena. A voter in a community election to subscribe to a bond issue for

improvement of the local airport may make his decision upon the understanding of the contribution of aviation to the economy or he may make his decision upon the basis of feelings that were acquired at the time he was learning about the relationship between aviation phenomena and the economy. What his actual decision would be would be difficult to predict. However, some research would suggest that with the strong negative feelings his decision might be affected by the emotional or attitudinal component."

In our study we tried to find out who takes an Aviation course and what effect this course has upon his attitudes toward the field.

AGE

Since our program is sequential, we will not belabor on the age classification of the students as this will be relative to the courses he is taking in the sequence i.e. --Sophomores in Aerospace I, Juniors in Aerospace II, etc.

SEX

In figure III, a sex distribution shows, as it did in 1970-71, that the majority of students attracted to the course are boys.

Figure III Sex Distribution

		70-71	71-72	72-73	3 yr. total	Percent
Aerospace I	Boys	33	63	37	133	74.3%
(10th grade)	Girls	10	17	19	46	25.7%
	Totals	43	80	56	179	100.0%
Aerospace II	Boys	19	17	13	49	80.3%
(11th grade)	Girls	6	3	3	12	19.7%
	Totals	25	20	16	61	100.0%

		70-71	71-72	72-73	3 yr. total	Percent
Aerospace III	Boys	27	21	21	69	75.0%
(12th grade)	Girls	6	14	3	23	25.0%
	Totals	33	35	24	92	100.0%
Totals for all 3 years	Boys				251	76%
	Girls				81	24%
	Totals				332	100%

ACADEMIC STATUS

Most studies of other high school report that aviation attracts primarily above average students in the B range. In our studies we find that we are attracting students from all ranges of academic status.

Figure IV shows that the present senior class has an academic range of 1.14 to 3.95 with the mean being 2.56.

Figure IV shows the present class to have an accumulative range of 1.03 to 3.95 with a mean of 2.24.

Figure IV Academic Status Aero III seniors

	1970-71 (Self-Report)			1971-72	1972-73
A	5	12%	Accumulative	1.07 to 3.23	1.03 to 3.95
B	17	39%	Mean	2.19	2.36
C	21	49%	Class Standing	198 to 40 (out of 205)	199 to 1 (out of 212)
D	0	--			

Accumulative Averages are not computed for Sophomores, thus the absence of this data, however, the Sophomore students were asked to estimate their grade average (A, B, C, D) and most reported in the C and B category (Figure VI).

Figure VI Academic Status Aero II (11th)

	1971-72 Self-Report		1972-73	
A	7	9%	Accumulative	.9 to 3.15
B	23	29%	Mean	2.16
C	48	60%	Class standing	185 to 26
D	2	2%		

COURSE INTEREST

Questions were asked of the students about which course they liked most and which they liked least.

Figure VII showed how the students responded.

Figure VII Course liked most (3 yr. totals)

AERO I

Aviation	110	61%
Science	32	18%
English	16	9%
Social Studies	7	5%
Food Service	8	4%
Math	6	3%
Totals	179	100%

AERO II

Aviation	35	57%
Social Studies	12	20%
English	3	5%
Science	11	18%
Totals	61	100%

AERO III

Aviation	58	63%
Social Studies	15	16%
English	15	16%
Science	4	5%
Totals	92	100%

Figure VIII Course liked least. (3 yr. totals)

AERO I

English	45	25%
Math	40	22%
Science	20	11%
Social Studies	15	9%
None	59	33%
Totals	179	100%

AERO II

English	26	43%
Math	18	30%
Aviation II	4	6%
Social Studies	8	13%
None	5	8%
Totals	61	100%

AERO III

Social Studies	42	46%
English	21	23%
Math	18	20%
Science	9	9%
None	2	2%
Totals	92	100%

The above figures show that of the courses liked most Aviation was chosen a total of 203 times, or 61% of the time while only 2 students or .6% chose it as their least liked subject.

4. A better attitude toward a choice in Aviation as their chosen vocation based on free choice after exposure to what is possible.

A basic question asked of the students was, "Why did you take this course?"

Figure VIII, page 20 shows that of all students 52% took the course because of a basic interest in flying, 22% are interested in making a career of some phase of Aviation, 10% took it from enjoyment, 7% for credit, 6% were just curious and 2% were inspired by their family.

In looking at this data we find that approximately 52% to 74% of the students took this course because of an interest in flying or with hope that it might lead to a future vocation. It is one of the goals of this project to further this interest as well as to cultivate the Vocational interests of those desiring to make a career in some Aviation related field.

In the general survey mentioned in part 2, several questions were asked the students regarding their future vocation.

A. Are you considering an Aviation oriented career?

	AERO I		3 yr. totals AERO II		AERO III		Totals	
Yes	92	51%	34	56%	48	52%	174	52%
No	78	44%	16	26%	24	26%	118	36%
Maybe	9	5%	11	18%	20	22%	40	12%
Totals (Across)	179	100%	61	100%	92	100%	332	100%

B. Has this course influenced your present vocation? (3 year totals)

	AERO I		AERO II		AERO III		TOTALS	
Yes	85	47%	29	48%	45	49%	159	48%
Intensified existing interest	25	14%	15	25%	20	22%	60	18%
Awareness of opportunities	43	24%	8	13%	22	24%	73	22%
Very little	4	2%	3	5%	2	2%	9	2%
No	22	12%	6	10%	3	3%	31	9%
Totals	179	100%	61	100%	92	100%	332	100%

C. Would you have considered an Aviation career had you not taken this course? (3 year totals)

	AERO I		AERO II		AERO III		TOTALS	
Yes	84	47%	32	52%	56	61%	172	52%
No	65	36%	25	41%	30	33%	120	36%
Maybe	30	17%	4	7%	6	7%	40	12%
Totals	179	100%	61	100%	92	100%	332	100%

In analyzing this data we find that 52% are considering an Aviation oriented career and 48% feel that this course has influenced their present interest.

Figure VIII Why did you take this course? (3year totals)

	AERO I		AERO II		AERO III		TOTALS	
1.) Interest in Flying	95	53%	32	52%	45	49%	172	52%
2.) Future occupation	38	21%	8	13%	28	30%	74	22%
3.) Enjoyment	15	8%	8	13%	10	11%	33	10%
4.) Curiosity	12	7%	5	8%	5	5%	22	16%
5.) Credit	15	8%	5	8%	3	3%	23	7%
6.) Family Inspired	4	3%	2	4%	1	2%	7	2%
7.) Teacher	--	--	1	2%	--	--	1	1%
Totals	179	100%	61	100%	92	100%	332	100%

INTEREST - APTITUDE SURVEY

(OVIS - Strong - GATB)

Hypothesis I

Improvement hopefully would be made from pre-test to post-test in the following areas of the OVIS Survey.

(Aero III) Crafts
Training
Applied Technology

After testing the students we placed the data for the above areas in stanines. We averaged the stanines to determine whether there was an increase or decrease. The results are as follows:

(Aero III)	Crafts	+1.4	
	Training	+1.6	(0 indicates no change)
	Applied Technology	+1.2	

The above data shows us that on the average, Aero III student's interests improved in all of the above areas from pre-test (1970-71) to post-test (1972-73). We feel that the Aerospace Program was an important factor in this improvement. However, student maturity, experience, and other courses have also complimented the positive gain.

Hypothesis 2

Improvement hopefully would be made from pre-test to post-test in the following areas of the Strong Survey.

(Aero III) Math
Science
Adventure
Air Force Careers

We again placed the data for the above areas in stanines. We averaged the results to determine whether there was an increase or decrease. The results are as follows:

(Aero III)	Math	+.4
	Science	-.5
	Adventure	+.4
	Air Force Careers	+.5

In the above results, we find that there is marginal gain in Math, Adventure, and Air Force Careers and a decrease in Science.

Hypothesis 3

In the GATB test, we predicted that of the four areas chosen, (Flight Training, Math-Science, Piloting and Surveying) Flight Training would be most predictive of success for the complete Aerospace program.

We analyzed the data for each student to see if they placed in the third grouping (needs improvement in ability to be successful in a particular area).

GATB 3rd grouping (needs improvement in ability to be successful)

	Flight training #	Flight training %	Math-science #	Math-science %	Piloting #	Piloting %	Surveying #	Surveying %
Aero I	3	8%	13	36%	6	17%	12	33%
Aero II	0	0%	5	31%	2	13%	4	25%
Aero III	0	0%	10	56%	3	17%	9	50%

In Flight Training, out of the second and third year students, none of those tested placed in the third grouping and only 8% of Aero I students were in this category.

In Math-Science, 56% of Aero III, 31% of Aero II, and 36% of Aero I placed in the third grouping. However, only two students in Aero I and II and none in Aero III received a 'D' or 'F' (students placing in the third grouping should find Aerospace difficult and should, according to their aptitude, receive a 'D' or 'F') which indicates to us that the Math-Science category does not seem to be good predictors for success in Aerospace Education.

In Piloting, there were only 17% of Aero III students who placed in the third grouping and the average grade for these students was a 'C' or above. Aero II students had 13% while in Aero I, 17% placed in the third grouping.

In Surveying, 50% of Aero III, 25% of Aero II and 33% of Aero I placed in the third grouping, but all of them received a 'C' or above. Surveying also does not seem to be a good predictor for success in Aerospace Education.

Looking at the above data, we find that student results were very predictive of success in the area of Flight Training and fairly predictive in the Piloting category. However, it is our contention that Math-Science and Survey bear little predictive value as to the students possible success in Aerospace Education.

Hypothesis 4

We hypothesized that Flight Training would have the least stanine variance of the four categories in comparing GATB grouping with letter grade.

We compared GATB grouping with each student's letter grade using the following scale:

GATB	2	1
Grade	'D' or 'F' 'C'	'B' or 'A'

We wanted to find out which grouping varied least in comparison with grade in Flight Training, Math-Science, Piloting and Surveying. The average variance between grade and GATB grouping are as follows:

Flight Training	+.50	(0 is a perfect match of
Math-Science	+.61	group with grade. Ex. -
Piloting	+.67	group 1 would get an 'A'
Surveying	+.83	or 'B')

Our data shows that of the four areas, Flight Training had the least variance.

Hypothesis 5

We hypothesized that students taking Aerospace III would have a higher stanine score in the following, in relation to the student profile:

OVIS - Crafts
Strong-Adventure

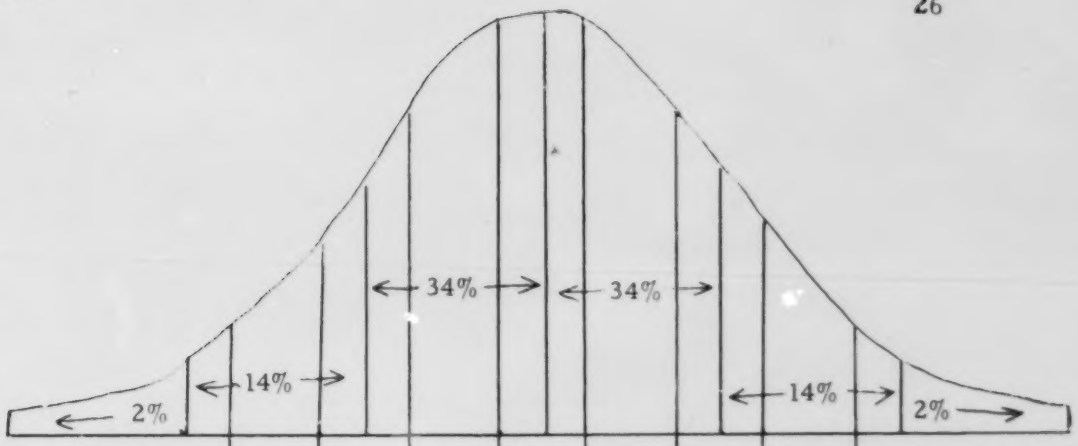
The average stanine range for students in Aero III were as follows:

OVIS	Stanine Average
Crafts	4.8
Training	4.2
Applied Technology	4.7
Strong	
Mata	3.5
Science	5.0
Adventure	6.8
Air Force Careers	1.8

The above data does not confirm our hypothesis in relationship to Crafts on the OVIS. However, Adventure is considerably higher in relation with the other Strong categories measured.

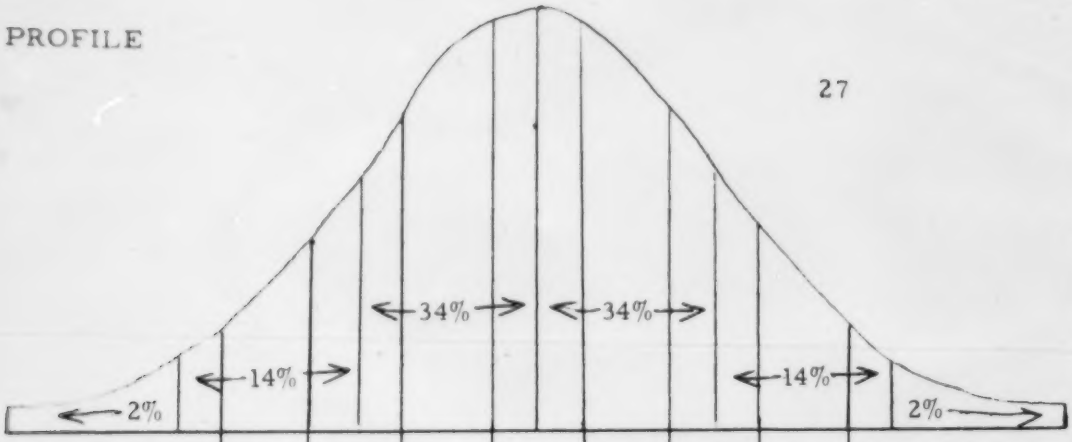
The following is a "student profile" for students in Aero I, II, and III and a composite of all Aerospace students.

STUDENT PROFILE
AERO I



	1	2	3	4	5	6	7	8	9
OVIS PR-TEST CRAFTS					5.0				
OVIS PR-TEST TRAINING					5.0				
OVIS PR-TEST APPLIED TECHNOLOGY				4.9					
	Very Low		Low		Average		High		Very High
STRONG PR-TEST MATH				4.0					
PR-TEST SCIENCE				4.7					
PR-TEST ADVENTURE						6.8			
PR-TEST AIR FORCE OFFICER			3.4						
GATB									
FLIGHT TR.						X			
MATH-SCIENCE				X					
PILOTING				X					
SURVEYING			X						
GRADES	F		D		C		B		A
10					X				

STUDENT PROFILE
AERO II



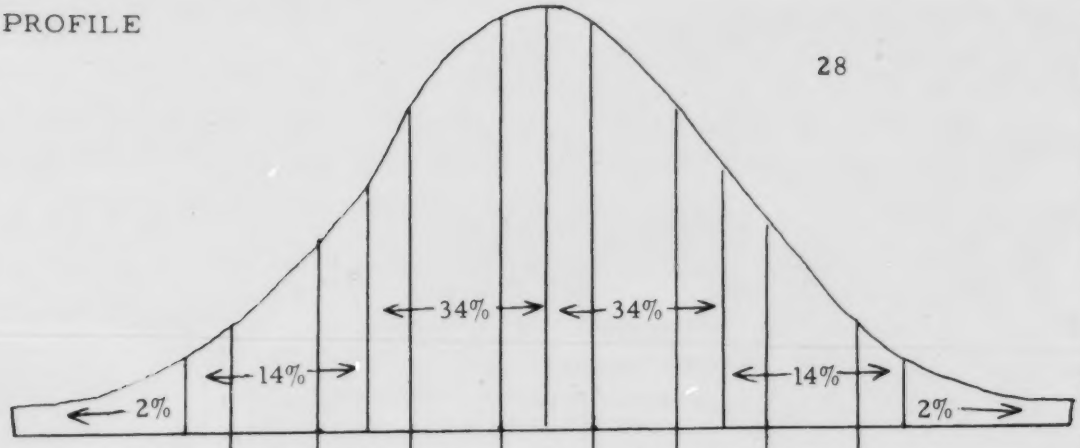
OVIS PR-TEST	CRAFTS	4.7
OVIS PR-TEST	TRAINING	4.9
OVIS PR-TEST	APPLIED TECHNOLOGY	4.4

		Very Low	Low	Average	High	Very High
STRONG PR-TEST	MATH		3.2			
PR-TEST	SCIENCE			4.5		
PR-TEST	ADVENTURE			6.9		
PR-TEST	AIR FORCE OFFICER		3.0			

GATB						
	FLIGHT TR.			X		
	MATH-SCIENCE			X		
	PILOTING			X		
	SURVEYING		X			

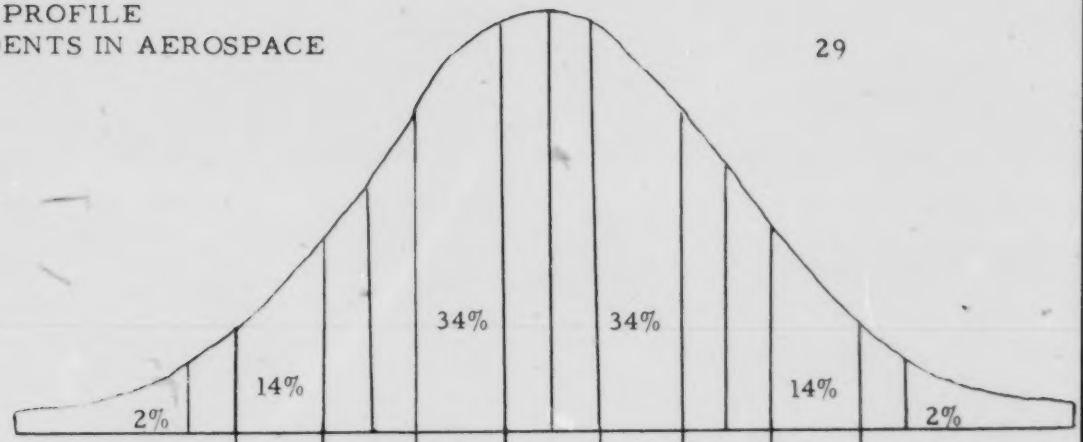
GRADES		F	D	C	B	A
	11			X		

STUDENT PROFILE
AERO III



		1	2	3	4	5	6	7	8	9
OVIS PR-TEST	CRAFTS				4.8					
PO-TEST							6.2			
OVIS PR-TEST	TRAINING				4.2					
PO-TEST							6.1			
OVIS PR-TEST	APPLIED				4.7					
PO-TEST	TECHNOLOGY					5.8				
		Very Low		Low		Average		High		Very High
STRONG PR-TEST	MATH			3.5						
PO-TEST					4.2					
PR-TEST	SCIENCE					5.0				
PO-TEST					4.7					
PR-TEST	ADVENTURE						6.8			
PO-TEST								7.0		
PR-TEST	AIR FORCE	1.8								
PO-TEST	OFFICER		2.9							
GATB										
	FLIGHT TR.							X		
	MATH-SCIENCE					X				
	PILOTING					X				
	SURVEYING			X						
GRADES		F		D		C		B		A
12						X				
CROSS COUNTRY										
		POOR-5		FAIR-4		GOOD-3		V. GOOD-2		EXCELL.-1
						X				

STUDENT PROFILE
ALL STUDENTS IN AEROSPACE



OVIS PR-TEST	CRAFTS			4.8					
OVIS PR-TEST	TRAINING			4.7					
OVIS PR-TEST	APPLIED TECHNOLOGY			4.7					
		Very Low		Low		Average		High	Very High
STRONG PR-TEST	MATH			3.6					
PR-TEST	SCIENCE					4.7			
PR-TEST	ADVENTURE						6.8		
PR-TEST	AIR FORCE OFFICER			3.1					
GATB									
	FLIGHT TR.						X		
	MATH-SCIENCE					X			
	PILOTING					X			
	SURVEYING			X					
GRADES		F		D		C		B	A
	ALL					X			

Summary

Due to the various tests used, comparisons through the stanine scale seemed to be the only practical way of looking at our results. Although not completely accurate, this method did give us some indication as to whether our predictions about Aerospace students were somewhat correct.

Participants will show a greater achievement by the end of Aerospace II in fields of Math, Science, Business, and Social Studies.

Students in Aero-Math, Science and Social Studies were pre-tested at the beginning of the year and tested again at the end of the year. The test given was the "Test of Academic Progress" developed by Houghton Mifflin Inc. Again we find that the student has made no measurable progress in these areas as measured by a standardized test. We feel that the questions on the test bear very little relationship to the material being taught.

In Aero-business the students were given a teacher-made test at the beginning and end of the course. The results showed a marked improvement in their knowledge of the subject at the end of the course compared to what they knew before. Data on these subjects are listed below.

AERO-BUSINESS (3 year totals)

	Pre-test	Post-test
Number of students	61	61
High	54	96
Low	4	60
Mean	32	78

AERO-MATH

Number of students	61	61
High	78	82
Low	29	38
Mean	51	55

AERO-SCIENCE

Number of students	61	61
High	82	88
Low	26	22
Mean	58	57

AERO-SOCIAL STUDIES

Number of students	61	61
High	70	78
Low	35	32
Mean	57	64

Participants will, by the end of the third year, make their choices to work in the Aviation Industry. Each participant shall be kept track of in their Aviation related job through D.C.T., C.O.E. programs already operated by this agency.

Out of the 1972-73 Senior (Aero III) class, 4 students out of 24, or 16 2/3%, are now working full time in Aviation as a result of placement by institution. Ten other students from previous years are continuing their Aviation education either in college or technical schools. The following students are continuing their education or are now working in an Aviation related field.

Scott Hill - AF ROTC - Miami University
Art Kramer - AF ROTC - Miami University
George Mehilo - Helicopter pilot - Army
Scott Arnold - Helicopter pilot & mechanic - Navy
Tom Borror - AF ROTC - University of Iowa
Carrie DelGado - C.F.I. - Miami, Florida
Jeff Wiebusch - A & P mechanic - Chagrin Falls Airport
Stan Osborne - Pittsburg Institute of Aeronautics
Kevin McRitchie - Pittsburg Institute of Aeronautics
Bob Russell - Commercial pilot - Zucker, Inc.
Steve Satava - Kent State University

This facility continues to maintain a career resource center for anyone interested.

Estimate of Actual Total Evaluation Costs

2nd Grant period 1971-72	$ 719.39
3rd Grant period 1972-73	$ 450.00
Final Evaluation Costs	$ 500.00

PART II

UNPREDICTED OUTCOME

Describe project activities in which the anticipated results have exceeded expectations and those in which results have not measured up to expectations.

A. The following outcome in the eyes of the project administration have exceeded our expectations for the three years.

1. A steady enrollment of students (approximately) 1/7 of the student body are enrolled in Aerospace courses. This is excellent considering it is an elective course.

2. Of the many students who say they want to continue in Aviation after high school, approximately 3 to 4 or around 13% are actually doing so.

3. Out of the present Seniors (Aero III) 6 out of 24 or 25% have indicated a desire to continue in an Aviation related field.

4. The spreading of interest and enthusiasm to neighboring schools. In the past year four (4) neighboring schools have began Aviation programs. (Chardon, Newbury, West Geauga, and Hudson). (Shown on BD-2-5 form) (copy attached)

5. On March 17, 1972, educators from the above schools plus representatives from Berea Schools, Kent State University, and United States Air Force met at Kenston High School to discuss the possibility of organizing a North East Ohio Aerospace Education Association. A committee was set up to develop a charter. One of the goals will be to set up a committee to consult with schools who are interested in starting an Aviation program. Kenston is now working with Kent State University to set up an Aerospace resource center there.

SECTION F - REPLICATION OF ESEA TITLE III PROJECT BY OTHER SCHOOL DISTRICTS

According to your best information, list the name and location of school districts which have replicated to a significant degree components of the ESEA Title III project reported on this form. (Add additional lines if necessary).

NAME	LOCATION
West Geauga High School	Chesterland, Ohio
Newbury High School	Newbury, Ohio
Ledgemont High School	Thompson, Ohio
Chardon High School	Chardon, Ohio
Hudson High School	Hudson, Ohio
Crispus Attucks High School	Indianapolis, Indiana
Youngstown Liberty High School	Youngstown, Ohio
Willoughby South High School	Willoughby, Ohio
Dupo High School	Dupo, Illinois
Westwood High School	Mesa, Arizonia
Waverly High School	Waverly, South Dakota

6. A favorable response from the community in support of the program. Also, a good many parents have continued to inquire into the possibility of an Adult Education course on Aviation.

B. The following outcomes in the eyes of the project administration have not measured up to our expectations.

1. One of our goals was to improve attendance. In 1970-71 Kenston set the record for attendance in Geauga County. During 1971-72 and 1972-73 we were plagued with several flu viruses. Figures show that the number of days absent will exceed the 1970-71 figure. 1972-73 year attendance was also up from 1971-72 due to flu virus epidemic and illness.

2. As mentioned in objective VI one of the objectives of this project is for the students in Aero II to show a greater improvement in fields of Math, Science, Business and Social Studies. Our success here has been marginal primarily due to the standardized achievement test in Math, Science, and Social Studies. There seems to be no correlation of the material covered in Aero II and questions on the standardize tests.

PART III

IMPACT OF TITLE III

Since the project began, there has been a great deal of enthusiasm among the students, faculty, and community. Several students who had no idea of what they wanted to do after high school now have some direction in which to concentrate their efforts. There seems to be a kind of comradeship between students whose background and previous interest lie elsewhere. Athletes, musicians, class and club representatives, students o high as well as low achievement now have something in common, some facet of life where they can relate to each other. In a few cases in which parents have become involved by either starting or renewing their pilot certificates, there seems to be a better line of communications between parents and child; something that is relative to both of their lives. Also, there has been greater increase in inquiries from other schools and from the community about our program and how soon an adult education program will be offered. An important aspect is the excellent attitudes of the students, faculty, and community towards the project. Thought by some in the community to be a "frill", they now see the importance of the program in our curriculum and how it affects the students. The biggest impact, however,

is the affect the program has had in the area of career guidance. As shown in figure VIII on page 20, the three year totals show that approximately 22% of those taking Aerospace are interested in Aviation as a possible future occupation.

PART IV

COOPERATIVE EFFORTS

A. Cooperating Agencies

1. Kenston High School
2. Horn's Flying School
3. Federal Aviation Administration Testing Division
4. Federal Aviation Administration Safety Division
5. Air Traffic Control
   a.) Cleveland Hopkins
   b.) O'Berlin Center
6. Link - General precision
7. Wright Airlines
8. Sanderson Films
9. United States Air Forces - CAP
   Wes Kimball - Great Lakes Regional Dir.
10. American Aviation
11. Mercury Aviation - Cuyahoga Co. Airport
12. Ashtrabula Jefferson - Glider Club

Cooperation between agencies participating in the project has been excellent. Horn's Flying School (the fixed base operator), has provided the facilities, equipment and flight instruction for the Flight Lab segment of the project. Instructors at the airport have offered their time to speak and counsel students on career possibilities. Air traffic control, who normally do not allow tours of Cleveland Hopkins Tower, Radar Room and flight service station, were generous enough to allow Aerospace III Seniors to tour their facilities and at the O'Berlin Center.

Representative of the Federal Aviation Agency (General Aviation District Office) came to Kenston to administer the FAA Private Pilot Exam and to give a presentation on flight safety. Results of the FAA exam is shown below.

General Precision Incorporated--developer of the Link GAT I aided in the placement of the trainer and established a student syllabus for us to use. They are also aiding in the dissemination of our project literature by including the flyer "The Sky's the Limit" in their sales literature.

Wright Airlines is accepting one of Kenston High School's students each year for participation in a scholarship program including a tour of their facilities and also writing of a paper on the importance of Air Taxi operations to a metropolitan area.

Sanderson Films has aided in dissemination by redistributing 1000 "Sky's the Limit" pamphlets.

Other agencies listed above have aided our program by providing tours and speakers.

FAA EXAM RESULTS

	1970-71	1971-72	1972-73	3 yr. totals
High	84	78	86	86
Low	26	34	36	26
Mean	65	58	64	63

V Dissemination

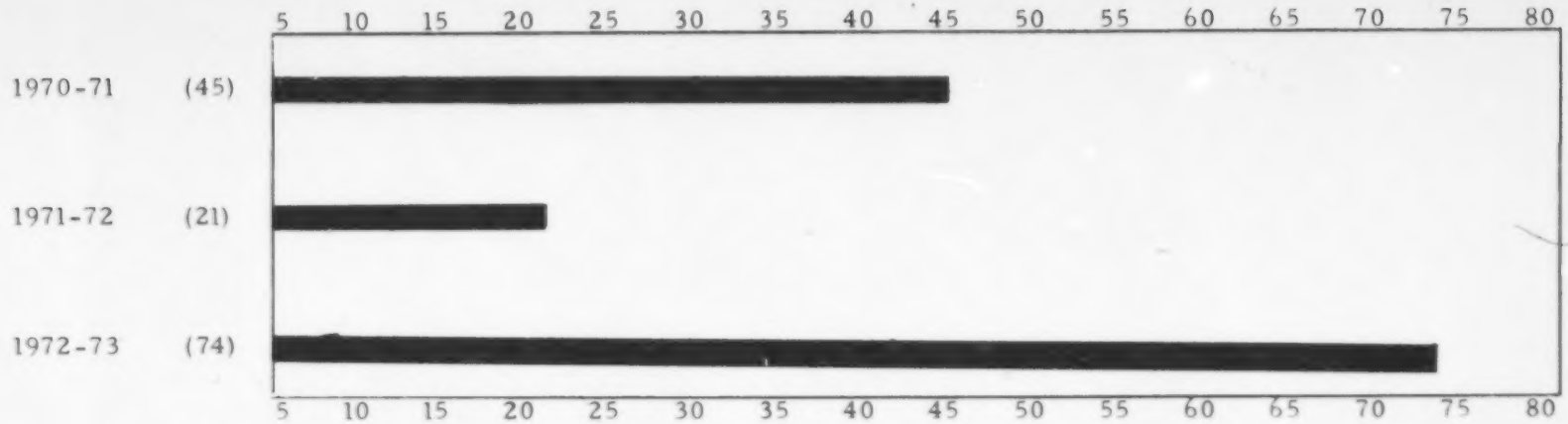
Information related to this project was disseminated in the following manner:

A. Materials mailed to unsolicited parties.

B. Materials mailed to solicited parties.

C. Materials given to visitors from within the project area or well on outside the project area.

REQUESTS FOR INFORMATION (UNSOLICITED)
Aerospace Education
Title III ESEA



In 1970-71, Kenston received nationwide publicity through the Aviation Distributors and Manufacturers Association (ADMA) mailed to educational and industrial institutions throughout the country. That year we received 45 requests for information. In 1971-72 we received only local publicity. However, this year (1972-73) we again received national publicity, once in the Title III Quarterly and again in the ADMA Education Bulletin.

In 1972-73 we had 11 visitors from Ohio and 4 visitors from other states.

We also mailed out 220 bulletins to possible interested parties throughout the country. Our estimated cost of dissemination is $260.00.

VI. Projected funding procedures

Project in a modified form (refer to Phase-In) will be funded wholly at the local level. (Phase-In--Appendix H)

VII. Costs

1972-73

Total Cost $42,000 Total 3 years - $133,860.00

Total non-Federal support $ 1200

	1972-73	Total
Total Federal support under Title III P. L. 90-247	$42,000	3 years $133,860

Total Federal support other than Title III P. L. 90-247 $ 0

APPENDIX A

AVIATION PROJECTS AND REPORTS

1. Read biographies of famous pioneers of flight and report to class. Below are a few to choose from:

   a). Montgolfier brothers
   b). Pilatre de Rozier
   c). Prof. J.A.C. Charles
   d). Pierre Blanohard
   e). Henri Gifford
   f). Alberto Santo-Dumo
   g). Count Ferdinand Von Zeppelin
   h). The Piccard Family
   i). Besnier
   j). Jean Marie Le Bris
   k). Percy Sinclair Pilcher
   l). Otto Lilienthal
   m). John J. Montgomery
   n). Sir George Chyley
   o). Octave Chanute
   p). Clement Ader
   q). The Wright Bros.
   r). Samuel Pierpont Langley
   s). Louis Bleriot
   t). Amelia Earhart
   u). Lindberg
   v). Howard Hughes
   w). Clyde Cessna
   x). Famous Aces of Wars - 1. Von Richthoven
   etc. 2. Rickenbacker
   3. Fokker
   4. Joe Foss
   etc.

2. Compile record of famous "First" such as

   a). First airplane flight (powered)
   b). First airplane to cross English Channel
   c). First U.S. Army airplane
   d). First international aviation meet
   e). First aviation meet in the U.S.
   f). First take off from water
   g). First women pilots
   etc.

3. Chart development of Aviation (Geneology charts may be obtained from such Aviation companies as Piper, Cessna, Beechcraft, Boeing, Lockheed, etc.)

4. Report on major contributions to Aviation made by various countries of the world.

5. Report on the differenct types of planes used in World War I.

   Example:

   France: Nieuport, Morene Spad, Breguet, Salmsen, LePere

   England: Bristal, AVRO, Sopwith, DeHaviland, Handly-page

   Italy: Capriond

   United States: Curitis JN-4 "Jenny"

   Germany: Taube, Albatross, Fokker, Rumpler, Pfalz Halberstadt, LVG, Gotha

6. Ibid World War II.

7. Report on County Airport Expansion Act (Ohio). Its success, etc. The advantages of having an airport in your community va. the disadvantages. Poll your community, residents, businesses, etc.

8. Trace the development of the gasoline engine from the rotary engines, such as the Mome rotaries through such famous engines as the Solmsen, Anzani, Three-Cylinder Lawrence, CX-5 and the Liberty, to the Wright and Allisor engines.

9. Trace the development of the Jet engine from the ram & pulse jets of World War II to the present.

10. Trace the history of rocket propulsion from Chinese to present.

11. Trace the history of Air Mail.

12. Report on famous women fliers such as:

Baroness de La Rookie	Jacqueline Cochran
Harriet C. Quimby	Jerrie Mock

12. Ruth Elder
Amelia Earhart
Joan Merriam Smith
Betty Williams
etc.

13. Investigate the history of Aviation or Space in Ohio.

14. Make a scrapbook of current events in Aviation and Space.

15. Report on the development of Military Aviation.

16. Report on the government's role in Aviation.

17. Build model of airplane with movable parts which when placed in a wind tunnel will show movement about the 3 axis.

18. Build model of airplane - including a report on its history, function, problems, etc.

19. Make a study of your community to see how many families are directly involved in Aviation. Parents who fly or own a plane; employed in an Aviation related industry. Examples: Bill Hollihan - flies for Wright Airlines; Bill Althans, Pres, of Crowe Aviation. Check faculty - Mr. Ferris, Mr. Roberge, and Miss Hess's parents all fly their own planes in their businesses.

20. Make a list of as many scientific principles (Newton's Law, Bernoulli's principle) as you can on their relationship to flight.

21. Construct a wind tunnel and test different shaped airfoils.

22. Make a study of the effect of drag on variously shaped bolies and how drag may be reduced in both subsonic and supersonic flight.

23. Build a match-head reaction engine. p. 445 Modern Space Sciences.

24. Show the reaction principle in a vacuum with the use of a balloon, bell jar, and vacuum pump.

25. Build a model helicopter to demonstrate autorotation.

26. Make a comparative study of the flight characteristics of the helicopter vs. the airplane.

27. Make a study on the history and progress of VSTOL (Vertical-Short Take Off and Landing) aircraft.

28. Report on the problem of congestion in our airways and at major terminals and what is being done about it.

29. Report on Gliders, their development, competition - construct a model.

30. Demonstrate comparative strengths of different types of aircraft construction (i.e., trues, simi-conocoque, monocoque, honeycomb, bonding, etc.)

31. Demonstrate types of stability: Neutral - round ball on a flat surface; Positive - round ball at the bottom of a convex surface; Negative - round ball on top of a concave surface.

32. Demonstrate a reciprocating engine by use of an auto engine model or cutaway.

33. Investigate the possibilities of atomic engines for aircraft.

34. Demonstrate a dihedral construction and its relationship to rolling stability by use of balsawood or cardboard gliders.

35. Report on principles involved in variations of propeller pitch. (fixed pitch - constant speed)

36. Demonstrate how various changes in the aircraft structure must be made to counteract the effect of propeller torque.

37. Report on types of deicers and the principles they employ.

38. Report on the safety features incorporated into the design and structure of the airplane.

39. Report on the safety feature employed by the FAA for use in our nation's airways.

40. Report and develop experiments on some phase of Meteorology and its effect on flight, such as:

a). Atmospheric pressure
How measure explaining principles of mercurial and aneroid barometers.

b). Temperature
Changes - effect with altitude.

c). Air Density

d). Convection currents
Colored liquids of different temperature.

e). Highs - Lows
Coriolis effect on their rotation.

f). Uneven heating of the earth's surface.

g). Density altitude
Compare aircraft performance for a plane at various altitudes.

h). Jet stream
Its effect on frontal movement.

i). Humidity

j). Cloud formations
Cloud chamber

k). Follow weather for one week
Construct your own surface analyses chart showing areas of Highs and Lows, frontal movements, etc. - keep data on weather conditions (temperature, pressure, wind direction, etc.) as fronts move through your area. Make 24-hour prognosis starting 2nd day.

l). Report on weather conditions relative to Geauga county. Why do we get more snow than other counties, etc. (Lake effect - Valley, etc.)

m). Compare maps of winds aloft with surface wind - discuss surface friction.

n). Report on the different types of clouds and weather associated with each.

o). Report on the weather services available to pilots and how one might take advantage of these services.

p). Report on the development of the Weather Bureau, etc.

41. Demonstrate the problems of Air Traffic Control by building a model "controlled" airport and simulating an actual problem of Air Control around an airport - stacking, holding patterns, etc.

42. Dramatize a cross country flight with one student as FAA "center" control operator, one as enroute station operator, one as tower operator to demonstrate air traffic communications.

43. Report on NTSB (National Transportation Safety Board) findings on aircraft accidents.

44. Demonstrate the principle of the gyroscope.

45. Build a model airport with all facilities and markings included.

46. Make a comparative study on the costs of air travel with that of automobile travel; also list advantages and disadvantages of each. Show tables or graphs, etc.

47. Make a comparative study on the costs of air freight with that of shipping goods by railroads and trucks - list advantages and disadvantages of each. Show tables or graphs, etc.

48. Make a comparative study of the safety of air travel with that of the automobile. Show facts.

49. Report on SAC (Strategio Air Comman) and its importance to our national defense.

50. Report on the Air Defense Identification Zone and Restricted Areas.

51. Report on the development of Navigation from simple pilotage to the complex Radio Navigation Systems now used in some major airliners. (Pilotage, Dead Reckoning, LMF Navigation, VOR, VORTAC, ADF, VAC, Celestial Navigation, etc.)

52. Demonstrate the operation of a sextant. Develop your own problems.

53. Report on some phase of Communication - demonstrate ware motion.

54. Design and construct models of NASA launch vehicles, satellites and probes.

55. Demonstrate how a satellite is placed in orbit and maintained.

56. Demonstrate and report on possible causes of moon oraters. Volcanoes, meteors, etc.

57. Take star trail pictures to show rotation of earth.

58. Make a bar shaped diagram of the electromagnetic spectrum marking off to scale such divisions as radio waves, infrared, visible spectrum, ultraviolet, radar, etc. Point out the narrow width of the visible hand.

59. Explain and illustrate a method which can be used to determine the speed of sound.

60. Explain and illustrate forces due to acceleration and/or change in direction. (G forces)

61. Demonstrate methods of determining distances in spece by trigonometry. Investigate other methods.

62. Demonstrate methods of showing presence of microscopic life in the atmosphere and on surface.

63. Report on the methods of determining the existence of life on the moon and other planets.

64. Report on NASA's Manned Flight program. Mercury, Gemini, Apollo, etc.

65. Report on NASA's Scientific Satellite program. Lunar probe - Mariner probe.

66. Report on NASA's Application Satellite program. Tires, Nimbus, etc.

67. Report on Life Support Systems of our Space Program.

68. Report on Environmental Systems of our Space Program.

69. Report on the Medical aspects of flight in both our atmosphere and space.

70. Report on airports yesterday, today, and tomorrow. Show diagrams or models of proposed airports - what has been the trend towards airport development and what can we expect in the future.

71. Report on the F.A.R. requirements set up by the F.A.A. for various licenses - private, commercial, instrument, etc. Poll the experts to see what possible changes in these requirements lie in the future.

72. Choose some problem occurring now in Aviation or Space and research it showing possible solutions. Example - Noise, Air Pollution; Air Congestion, Air Traffic Control, Air Collisions, Baggage Distribution, Ground Transportation, Government Restrictions, etc.

73. Build a wind tunnel - demonstrate the flow of air over various shaped objects.

74. Build a F.S.S. Aviation Weather Station as set up by the U.S. Weather Bureau - Show charts, reports, etc. explaining the uses and function of each.

75. Rebuild one of our navigation instruments so that it works - explain how it works and uses derived from it in flight.

NARCO Mark 10	VOR-Omni Head
NARCO Mark 12	D.M.E.
NARCO Mark 16	A.D.F.
NARCO Mark 24	

76. Take an old plane - break it down and completely rebuild both the airframe and powerplant (under supervision of A & E Mechanic with F.A.A. inspections).

77. Report on trends in Aerospace Education in Elementary, Secondary and Colleges.

78. Report on Careers in Aviation & Space.

79. Report on Aviation and Space Law.

80. Report on the complex navigation and communication facilities in Aviation - their reliability, etc.

81. Report on Air Rescue.

82. Report on Mathematics and its application in Aviation and Space.

83. Report on Telemetry - its functions and importance in our space program.

APPENDIX B

AEROSPACE I

I. Philosophy

Aerospace I is a basic survey course to introduce and orient the student to the entire aerospace field. It should serve as an independent course for the student taking only this course, as well as the basic course for the student taking the entire three-year program. Basic training in the Link Trainer, an orientation flight in a four place airplane and a glider flight are a part of the course.

II. Objectives

A. The students at Kenston should be given the opportunity to become literate in the dominant transportation of our nation and world.

B. Become acquainted with the study of Aviation & Space.

C. Understand the significance of important events and rapid progress achieved in atmospheric flight and space exploration.

D. Become familiar with the advantages of air travel over surface and water transportation.

E. Realize the dynamic nature and potentialities of the Aerospace Age.

F. Become aware of Aviation's potential to serve them as a user of transportation in their work and recreation, and the terrific impact it has on all individuals throughout the world.

G. Understand the nature and significance of the Aerospace Manufacturing Industry, the Air Transport Industry and General Aviation.

H. Understand the impact of Aerospace affairs on the economics, political, and technical facets of Society.

I. Realize the importance of Aerospace Research and Development.

J. Recognize their civic responsibilities in supporting and promoting the Aerospace Industry at community, state and national levels.

K. Survey the main vocational and career opportunities.

III. References

A. Aviation Fundamentals - Sanderson

B. Aeroscience - Aero Products Research, Inc.

C. Intro to Aeronautics - American Technical Society

D. NASA Facts - NASA

E. Air transport facts and figures - Nat'l Transport Asc.

F. Fundamentals of Aviation & Space Tech, - Univ. of Illinois

G. Applied Aviation Science - AV Company

H. The Airport and your Community - FAA

I. The Airport, A Community Asset (ATTA)

J. Aviation Hall of Fame (G.E.)

K. The Family of Man-Prospects for Progress (G.E.)

L. Civil Air Patrol Texts - (CAP)

1. Aircraft in Flight
2. Power for Aircraft
3. Introduction to Aerospace
4. Navigation and Weather
5. Airports, Airways, and Electronics
6. Aerospace Power
7. Dawning Space Age

I. Basic Aeronautics

A. The Earth's Atmosphere

1. Properties
2. Characteristics of Gases
3. Expansion and Molecular Movement
4. Extent of the Atmosphere
5. Pressure
6. Torricelli
7. Density
8. Insolation
9. Chapter Questions

B. Theories of Flight

1. Bernoulli's Principle
2. Venturi Tube Concept
3. Airfoil
4. Newton's Third Law of Motion
5. Factors of Lift
6. Other Factors of Flight

C. The Four Forces Acting on an Airplane in Flight

1. Lift
2. Gravity
3. Thrust
4. Drag
5. Chapter Questions

D. Materials Used in Aircraft Construction

1. Wood
2. New Materials
3. Plastics
4. Metals

E. Aircraft Structure

1. Fuselage
2. Cockpit or Cabin
3. Wings
4. Wing Platform
5. Power Plant
6. Landing Gear
7. Stress
8. Fatigue
9. Load

F. Power Plants - Reciprocating Engines

1. Historical Background
2. Action of Reciprocating Engine
3. Types of Reciprocating Engines
4. The Engine Cycle
5. Cylinder
6. Crankshaft
7. Camshaft
8. Crankcase
9. Valves
10. Engine Systems
11. Fuel Essentials
12. Horsepower

F. Power Plants Cont.

13. Fundamentals of Engine Design
14. Superchargers
15. Engine Instruments
16. Engine Controls
17. Propellers
18. Applications of the Action - Reaction Theory
19. Air-Breathing Engines
20. Non-Air Breathing Engines
21. Jet Engines
22. Noise
23. Braking
24. Water Injection
25. Turboprop/ Turboshaft

G. Aircraft Stability

1. Axes of the Airplane
2. Stability and Equilibrium
3. Torque
4. Control During Flight
5. STOL Aircraft

H. Aircraft Performance

1. Weight and Balance
2. Takeoff, Cruise and Landing
3. Factors Affecting Stall Speed
4. Loads and Load Factors

I. Flight Instruments

1. Basic Flight Instruments
2. Pilot Static System Flight Instruments
3. Magnetic Compass
4. Gyroscopes

J. Helicopters

1. Rotary Wing Aerodynamics
2. Autorotation
3. Controls
4. Other Helicopter Components and their Functions
5. Main Rotor System

II. Meteorology

A. Factors of Weather

1. The Atmosphere
2. Temperature
3. Atmospheric Pressure
4. Station Pressure and Pressure Variations
5. Wind
6. Moisture
7. Stability
8. Turbulence

B. Clouds, Fronts and Storms

1. Clouds
2. Cloud Families
3. Air Masses
4. Fronts
5. Thunderstorms
6. Icing
7. Ceiling and Visibility

C. Aviation Weather Reports and Forecasts

1. Weather Observations
2. Basic Analysis and Forecasting Centers
3. Special Processing Centers
4. Surface Weather Observations
5. Special Observations
6. PIREPS
7. Pilot Weather Report Summary (UA)
8. Weather Radar Observations (SD)
9. Radar Report Summary (SD-1)
10. Daily Weather Maps
11. Constant Pressure Charts
12. Aviation Weather Forecasts
13. Area Forecasts (FA)
14. Typical Area Forecast
15. Winds Aloft Forecasts (FD)
16. Significant Meteorological (SIGMET) Advisories
17. Hurricane Advisories (WH)
18. Severe Weather Outlooks (AC)
19. Severe Weather Forecasts (WW)
20. Regional Weather Prognoses (FN-1)
21. Continuous Transcribed Weather Broadcast

D. High Altitude and Arctic Weather

1. High Altitude Weather
2. Arctic Weather

III. Navigation

A. History of Navigation

1. Early Navigation
2. Sixteenth Century Navigation
3. Eighteenth Century Navigation
4. Piloting and Dead Reckoning
5. Mercator Projection
6. Lambert Projections
7. Magnetic Compass
8. Aids to Navigation
9. Great-Circle Sailing
10. Celestial Navigation
11. Shape of rhe Earth
12. Celestial Mechanics

B. Elements of Surface and Air Navigation

1. Time
2. Coordinates of the Earth
3. Relationship of Latitude and Distance
4. The Grid System
5. Navigation on a Spherical Earth

C. Navigation Aids

1. Airways
2. Sectional Aeronautical Charts
3. Types of Aeronautical Charts

D. The Mechanics of Navigation

1. E6-B Flight Computer
2. Calculator Side
3. Measurement of Courses - Plotter
4. Effect of Wind
5. The Plotter
6. E6-B WindSide

E. Radio Navigation

1. VOR and VORTAC
2. The Low Frequency Range
3. Automatic Direction Finder
4. Hypothetical VFR Flight Using Radio Aids

IV. Rules of Flight

A. Airman's Information Manual

1. Good Operating Practices
2. Tactical Air Navigation (TACAN)
3. Distance Measuring Equipment (DME)
4. Glasses of VOR/VORTAC/TACAN
5. Instrument Landing System (ILS)
6. Maintenance of FAA Navaids
7. Navaids with Voice
8. Frequency Utilization Plan
9. Radio Interference
10. Radar
11. Airport, Air Navigation Lighting and Marking Aids
12. Radiotelephone Communication
13. Communication Phraseology and Technique
14. Altimetry
15. Weather
16. ATC Procedures
17. VFR Flight Plan
18. Communications with the Tower or Ground Control
19. Clearance and Departure Controls
20. Enroute Control
21. Arrival Control
22. Landing
23. Emergency Procedures

B. Federal Aviation Regulations

1. General Definitions
2. Abbreviations and Symbols

C. Federal Aviations Regulations

1. Certification: Pilots and Flight Instructors

D. Federal Aviation Regulations

1. Certification: Airmen Other Than Flight Crewmembers

E. Federal Aviation Regulations

1. General Operating and Flight Rules
2. Flight Rules

V. High Speed Aerodynamics

A. Speed of Sound Waves

1. Characteristics of Sound
2. Speed of Sound
3. Compressibility

B. Wave Phenomena

1. Bow Wave
2. Velocity
3. Critical Mach Number
4. Chock Wave
5. Expansion Wave

C. High Speed Flight

1. Transonic and Supersonic Flight

D. Supersonic Design Parameters

1. Transonic and Supersonic Configurations
2. Stability of Supersonic Aircraft
3. Planform Effects, Sweepback
4. Control Surfaces
5. Thermal Barrier

VI. Physiology of Flight

A. The Human Body in the Atmosphere

1. Physics of the Atmosphere
2. Respiration and Circulation
3. Hypoxia
4. Hyperventilation
5. Eustachian Tube
6. Sinus Blockage
7. Toothache
8. Gastro-Intestinal Pains
9. Evolved Gases
10. Cabin Pressurization

B. Vision

1. Principles and Problems of Vision
2. The Anatomy and Physiology of the Eye
3. Illumination Levels and Techniques of Seeing
4. Physiological Effects of Noise, Vibration, and High Speed Flying.
5. Sensory Illusion of Flight

VII. Man in Space

A. The Early History of Space Flight

B. The Solar System

1. Extent of the Solar System
2. The Sun
3. Earth
4. Mars
5. Venus
6. Mercury
7. Jupiter
8. Saturn
9. Uranus
10. Neptune
11. Pluto
12. Asteroids, Comets, and Meteoroids

C. Thrust Required for Space Flight

1. The Rocket Engine
2. Rocket Engine Performance
3. Solid-Propellant Rocket
4. Future Propulsion

D. Guidance Systems for Space Flight

1. Tracking Through Space
2. Communications
3. Tracking from the Ground
4. General Principles of Bodies Moving in Space
5. Launching a Satellite into Orbit
6. What Keeps a Satellite Up?
7. How a Satellite is Made to "Stand Still"
8. Escape Velocity

E. Unmanned Satellites and Sounding Rockets

1. Scientific Satellites and Sounding Rockets
2. Discoverer (US Air Force)
3. Sounding Rockets
4. International Cooperation in Space
5. Application Satellites

F. From Earth to the Moon and Beyond

1. Prior Scientific Information
2. Unmanned Lunar and Interplanetary Spacecraft
3. Manned Space Flight
4. Project Gemini
5. Apollo

G. Living in Space

1. Major Human Problems in Space
2. Living on Earth
3. Basic Elements of Living in Space
4. What Lies Ahead?

VIII. History of Aviation

A. Mythology and Religion

1. Daedalus and Icarus
2. Mercury
3. Pegasus
4. Magic Carpet
5. King of Britain
6. Kites
7. Biblical Accounts of Flight

B. The Balloon Era

1. Joseph and Etienne Montgolfier
2. De Rozier and De Arlandes
3. J. A. C. Charles
4. The Balloon in War
5. The Ballooning "Rage"
6. Exploration with Balloons
7. Powered Balloons

C. Advent of Heavier-Than-Air Flight

1. Da Vinci
2. Sir George Cayley
3. Henson and Stringfellow
4. Early French Attempts
5. Montgomery
6. Chanute
7. Lilienthal
8. Langley
9. Wright Brothers Inaugurate Heavier-Than-Air Flight
10. Alberto Santos-Dumont Versus the Wrights
11. The U.S. Opens Its Eyes
12. Glenn Curtiss
13. The Father of Naval Aviation
14. Bleriot

D. Pre-1914 Air Shows

1. Rheims
2. Dominguez Field
3. London to Manchester
4. Harvard and Belmont

E. Pre-1914 Aviation Records

1. Calbraith P. Rodgers
2. Lincoln Beachey
3. Glenn Martin
4. Sikorsky
5. The Airplane Goes to War
6. Airmail
7. New Aerial Developments
8. First Mediterranean Crossing
9. Speed Merchant
10. Endurance and Weight
11. First Airline

F. World War I

1. Status of the Airplane at the Beginning of World War I
2. Developments of the Synchronized Machine Gun
3. Famous Airplanes of World War I
4. Aces of World War I
5. Lafayette Escadrille
6. Jagdstaffeln
7. Aerial Acrobatics
8. Lighter-Than-Air Craft in World War I

G. Post-World War I

1. US Air Service
2. Conversion to Peacetime
3. Beginnings of Airlines in U.S.
4. Decline of Military Aviation in the United States
5. Air Racing
6. Aircraft Safety

H. The Great Challenges

1. Transcontinental Flights
2. The Atlantic
3. Women in Aviation
4. Dirigibles Again
5. The Pacific
6. Globe Circling Flight
7. Behemoths of the Air
8. Polar Explorations
9. Aerial Explorations of the Antarctic

I. Pre-World War II

1. Conflicts

J. World War II

1. Blitzkrieg
2. Dunkirk
3. The Battle of Britain
4. American Arms
5. Pearl Harbor
6. The Long Road to Victory

K. Post-World War II

1. The Military Let-Down
2. Korean "Conflict"
3. Aeronautical Research

IX. Opportunities

A. General Aviation Careers

1. General Aviation

B. FAA Careers

1. Aeras of Responsibility

C. Career Planning

1. Planning Ahead
2. National Aeronautics and Space Administration

D. Armed Services Careers

1. The Military

E. Airline Careers

1. The Airline Industry

X. Films

A. Aerial Application

1. Chemical Safety in Aerial Application FA-616

B. Aerodynamics and Conditions of Flight

1. How Airplanes Fly FA-703
2. Density Altitude FA-603-A
3. Stable and Safe FA-704
4. Sonic Boom and You FA-811
5. Caution: Wake Turbulence FA-10-70

C. Aircraft

1. Plane is Born, A FA-602
2. Plane Sense FA-807
3. Safety By the Numbers FA-802
4. You and Me and the SST FAC-133

D. Airports

1. Airports In Perspective FA-706
2. Best Investment We Ever Made, The FA-304
3. Dulles International Airport--Port of the Future FAC-121

4. Dulles International Airport--Progress Report FA-124
5. It Pays To Stay Open FA-609
6. Place to Land, A FA-709

E. Air Traffic Control

1. At The Other End Of The Mike FA-133
2. Controller-Computer Partnership, The FA-906
3. Flight Service Station, The FA-901
4. Flight To Grandmother's, A FSP-2
5. Introduction to NAS Enroute Stage A FA-710
6. One Eye On the Instruments FA-209
7. Traveler Meets Air Traffic Control, A FA-102
8. Using The Airspace FAC-122
9. Weather Surveillance Radar AP-7-8
10. What's My Traffic? FA-201

F. Aviation Careers

1. Aviation Mechanic FA-315
2. Aviation--Where Career Opportunities Are Bright FSP-1
3. Aviation Workshop FA-605
4. Brother FA-01-71
5. Flight FA-117
6. How About Billy Wilson? FA-617
7. How to Succeed Without Really Flying FA-06-71
8. In These Hands FA-123
9. This Is FAA FA-708

G. Aviation History

1. Aeronautical Oddities WF-00-36
2. Kites To Capsules FA-905
3. Man and Flight . . . . . State Library
4. We Saw It Happen SFP-355

H. Aviation Medicine

1. Aeromedical Research and The Controller's Health FA-137
2. All It Takes Is Once FA-801
3. Medical Facts for Pilots FA-01-70
4. Charlie FA-618
5. Restraint For Survival FA-805
6. Rx For Flight FA-606

I. Civil Defence

1. Spotlight On Recovery FA-603

J. Crash Fire Rescue

1. Blanket For Survival FA-607
2. Transport Crash Safety Test--Part I FA-515
3. Transport Crash Safety Test--Part II FA-615

K. Flying Clubs and Flight Instruction

1. Flying Clubs FA-705
2. Path to Safety FA-612

L. Inspection and Maintenance

1. Aviation Mechanic FA-315
2. From the Ground Up FA-903
3. In These Hands FA-123
4. Inspectors, The FA-701
5. Other Passenger, The FA-601

M. International Aviation

1. International Skies FA-904

N. Navigation

1. Area Navigation FA-02-70
2. Instrument Landing System--The Localizer FA-305-A
3. Instrument Landing System--The Glider Slope FA-305-B
4. One Eye On the Instruments FA-209
5. Radio Procedures For Pilots FA-902
6. This Is VORTAC FA-104
7. To Save A Life FA-129
8. Using the Airspace--Navigation and Communications FAC-122

O. Research and Development

1. New Look At Fog, A FA-608
2. Path From The Sky FA-119
3. Project Slush FA-217
4. Today for Tomorrow FA-907
5. Flight to Tomorrow . . . . . NASA

P. Weather

1. Air Masses and Fronts AP-3
2. Atmosphere, The AP-1
3. Fog, Stratus and Icing AP-4
4. Meteorology--Fog and Low Ceiling Clouds--Ground Fog and Advection Fog FAN-101
5. Meteorology--Fog and Low Ceiling Clouds--Upslope Fog and Frontal Fog FAN-102
6. Meteorology--Ice Formation On Aircraft FAN-100
7. Meteorology--The Cold Front FAN-103
8. Meteorology--The Warm Front FAN-104
9. Stability In The Atmosphere AP-2
10. Thunderstorms and Turbulence AP-5
11. Weather Surveillance Radar AP-7-8

Q. Economics

1. Wings at Work . . . . . Lockheed
2. You Call The Shot . . . . . Lockheed

R. Audio Visuals Distributors, Manufacturers, & Association

1. Sanderson Films-Times Mirror
   8065 E. 40th
   Denver, Colorado 80207
   C. E. Neal

2. Aero Products Research, Inc.
   18111 Teale Street
   Culver City, California 90230

3. Civil Air Patrol
   Maxwell Air Force Base
   Alabama 36112

4. University of Illinois
   Institute of Aviation
   Urbana, Illinois 61801

AEROSPACE II

Objectives

1. The general purpose of this course is to enable the students to reinforce their learning in the areas of science, mathematics, business, and social studies by applying their knowledge and understandings to aviation.

2. By team teaching, the students will be taught specific skills relating to aviation in each of the subject areas.

3. Individual projects approach will be the main emphasis of this course. Student's potential can best be served in this way. Projects must demand a minimum quality with no maximum limits. OUTLINE OF COURSE OF STUDY IN EACH SUBJECT AREA.

AERO-SCIENCE (9 weeks)

Objectives

1. To provide an understanding of those aspects of science most pertinent to the understanding of flight.

2. To provide some understandings and attitudes compatible with probable developments in flight.

3. To utilize the enthusiasm of a specific interest group to further understanding and attitudes in the broad field of science.

A. History

Film	Kinetic-molecular theory of gases
Lab 1	Change in density with temperature-hot air balloon
Lab 2	Balloon ceiling Change in density with pressure
Demonstration	Density of gases - helium vs hydrogen
	Filled lighter than aircraft
	Akron-Macon design (to introduce propulsion)

B. Fluid pressure and reaction

Lab 3 — Impulse and momentum-kinetic energy

Propeller

Jet

Fluid Flow

Lab 4 — Flow around solids

Lab 5 — Develop air foil

Lift - stall

Resistance

Vector addtion of forces - dihedral

Vector addition of velocity and motion

Navigation

C. Acceleration

Lab 6 — Forward

Lab 7 — Centripetal

Mach numbers

Film — Biological effect

Structural compensation

D. Materials

Film — Alloys

Lab 8 — Strain

Fatigue

Lab 9 — Structure

Lab 10 — Corrosion

E. Electricity

Demonstration Battery	
	Simple Circuits
Lab 11	Magnetic effects
	Magnetos
	Instrumentation

F. Future

Field Trip Rocketry	
NASA	Ballistics
	Ion Drive
	Problems of zero gravity living
Lab 1	Construction of small hot air balloons from plastic bags and candles
Lab 2	Plot of volume vs. temperature and volume vs. pressure
Lab 3	Construction of wire guided carbon dioxide propelled models
Lab 4	Use of continuous flow ripple tanks to examine the flow around various shapes
Lab 5	Airfoils mounted on pan balances to demonstrate lift
Lab 6	An adaptation of PSSC introduction to acceleration
Lab 7	An extension of the above to centripetal force
Lab 8	An examination of strained transparent plastic objects in polarized light
Lab 9	An extension of Lab 8 with the examination of more complex structures

Lab 10 — Measurement of the voltage produced by dissimilar metals in an electrolyte

Lab 11 — Measurement of the potential developed in a conductor moving in a magnetic field

AERO-MATHEMATICS (9 weeks)

Objectives

1. To provide practical applications of mathematics skills to the field of aviation
2. To motivate increased interest among students by encouraging them to see how the principles of mathematics are used in real-life situation
3. To reinforce basic math concepts, as well as present new ones
4. To stress the importance of mathematics in aero-space, as well as in other areas of life outside the classroom

Content

I Basic concepts

- A. Coordinates
  - 1. Longitude
  - 2. Latitude
- B. Distance
  - 1. Knots
  - 2. Statute mile conversion
- C. Direction
  - 1. Course
  - 2. Heading
  - 3. Track
  - 4. Bearing
  - 5. True vs. magnetic
  - 6. Variation
  - 7. Deviation
  - 8. Compass errors

II Chart reading and pilotage

- A. Aeronautical symbols
- B. Cultural symbols
- C. Night pilotage
- D. Chart reading in flight

III Dead reckoning procedures

- A. Plotting
- B. Plotting equipment

IV Instruments used in dead reckoning navigation

- A. Magnetic compass
- B. Gyrocompass
- C. Altitude and the altimeter
- D. Atmospheric weight and density
- E. Measurement of atmospheric pressure
- F. Altitude corrections
- G. Computer altitude solutions
- H. Airspeed, pilot-staic system, and the airspeed indicator
- I. Airspeed definitions

V Wind and its effect

- A. Wind direction and speed
- B. Effect of wind
- C. Drift correction
- D. Groundspeed
- E. Vectors
  - 1. Diagrams
  - 2. Triangle of velocities
- F. Average groundspeed

VI Good flight practices and navigation to landing approaches

- A. Air navigation radio aids
- B. Additional radio aids
- C. The radio direction finder
- D. Use of the automatic direction finder
- E. Manually operated direction finder
- F. Irregularities of radio bearings
- G. Procedure turns, holdings, and stacking
- H. Instrument landing system
- I. ILS slight procedures
- J. Ground control approach
- K. Automatic direction finder approach
- L. Low frequency radio range approach
- M. VHF Omnirange approach

VII Landing aids

A. Surveillance radar
B. Air traffic control radar beacon systems
C. Radar traffic information
D. Instrument approach light systems
E. Visual approach slope indicator
F. In-runway lighting
G. Runway end identifier light
H. Marking

Projects

1. The construction and solution of flight plans, traffic-control problems

2. Reports on the operation of mathematical-aviation processes

3. Measurements
   A. Design airfoil
   B. Analyze stresses and strains of materials
   C. Compute space trajectories
      1. Simulate moon shot
      2. Plan Apollo trip
      3. Utilize NASA and computers
      4. Conduct mathematics of speed computations

AERO-BUSINESS (9 weeks)

Objectives

1. To provide an understanding of those aspects of business that relate to aviation

2. To enable the students to solve problems in aviation business by applying business principles and concepts

3. To increase motivation for learning in business by applying subject matter to interesting practical applications

Content Outline

I Airports and Airways

A. Airports and Airways Growth and Development
   1. Present and future need for airports and landing fields
   2. Equipment, building, and land needs and expenditures

B. Charting Airports and Airways
   1. Understanding symbols involved on aeronautical charts
   2. Penmanship's importance

C. The Role of Electronics in Aircraft Control
   1. Expenditures for radio and related electronics equipment
   2. Problems of obtaining trained personnel, labor disputes, labor agreements

D. Functions of Airports
   1. Providing safe landing and takeoff problems
   2. Airport related services--expenses, management, subcontracting problems
      a. Newsstands, drugstores, gift shops, and restaurants.
      b. Parking lots, automobile leases, hotels or motels, and transportation.
      c. Passenger reservation clerks, ticker agents, travel bureaus, and etc.

E. Functions of airways
   1. Expenditures for equipment to provide air-to-air communication and air-to-ground communication
   2. Problems of abtaining trained pilots, labor disputes, labor agreements

F. The Regulation of Air Traffic
   1. Governmental Controls--implication and meaning
   2. Legal problems

G. The Flight Rules
   1. Governmental Controls--implication and meaning
   2. Legal problems
      a. Pilots rules while flying, passenger responsibility, cargo responsibility
      b. Airport and airline responsibilities and obligations

Projects

1. Field trip to a large and small airport to observe, question and discuss some of the above problems.
2. Invite an outside speaker such as a lawyer or FCC representative to discuss the above legal implications.
3. Obtain, read, and discuss aviation controls put on by government.
4. Sample charting by simulating symbols used by the airports and airways.

II The Uses and Effects of Aviation

A. Aircraft and Missile Manufacturing
   1. Number of people employed directly and indirectly
   2. Capital expenditure for businesses engaged directly and indirectly in manufacturing airplanes, airports, and building and land.

B. Airline Transportation
   1. Size of international, national, local airlines
   2. Number of passengers transported and number of miles
   3. Number of tonnage cargo transported and number of miles

C. Aircraft in Business--specifically
   1. Transportation of special types of cargo
      a. Fruit and vegetables
      b. Machinery and tools
      c. Drugs
   2. Transportation of special types of passengers
      a. Corporation executives for conferences, conventions, and purchases/sales
      b. Government officials--nationally and internationally

D. Aircraft in Agriculture
   1. Planting, fertilizing, cultivating, harvesting and spraying of crops
   2. Inspection and condition of farm animals

E. Other use of Aircraft
   1. Fishing, public utilities, mining, and weather forecasting
   2. News reporting with aerial photography
   3. Educational television
   4. Recreational coverage

F. Business Adversely affected by Aviation
   1. Railroads
   2. Trucking
   3. Shipping

Projects

1. Discuss aviations impact upon production, distribution, and consumption of goods.
2. Discuss aviations importance of transporting executive and government personnel.
3. Discover by reading newspaper and periodical reports how often and how much merchandise and passenger service is performed nearly every day.
4. Obtain, read, and discuss statistics and information from U.S. Government sources and privated industry sources all the above points.

III Economic Effects

A. Employment Opportunities
   1. Development of a salable skill in aviation
   2. Supply and demand for aviation labor
   3. Related aviation labor outlook
   4. Careers in aviation and related fields

B. The worth of Aviation Industries
   1. Military expenditures for aviation
   2. Civil expenditures for aviation
   3. Passenger travel and growth
   4. Air cargo travel and growth

C. Importance of Aviation for Non-aviation Industries
   1. Improvements in the flow of goods and services in existing business
   2. Demand on existing basic industries
   3. Need for new industries bought into existence

Projects

1. Obtain, read, and discuss government and private information about careers directly and indirectly involved in aviation.
2. Aviation management problems

AVIATION IN OUR CULTURE (9 weeks)

Objective

1. To understand some of the effects of the growth of the aviation industry on U.S. political institutions.
   (a) How did our government get interested in the Air Postal Service?
      (1) Review some materials on the history and background of this service
   (b) What legislation was initiated in conjunctio[illegible] this service? What were the implications of such legislation?
      (1) Review more recent legislation. (After W. W. II) What notations can we make from this review, concerning the growth of aviation?
   (c) What were some of the original regulatory agencies affection aviation? (After 1920)
   (d) Review the structure and powers of some of the recently organized agencies (After W. W. II)
      (1) What are the implications of these changes?
   (e) What court decisions have had an effect on the aviation? (Each student should limit this to one or two, that may be researched)
   (f) Creative Projects
      (1) Class could organize themselves into several committees to study such contemporary problems as the airport dilemma, hi-jacking, etc.

International Implications

Objective

1. To understand some of the effects of the growth of the aviation industry on international relations.
   (a) Briefly review the growth of international aviation.
      (1) What are the implications of such growth?
   (b) How do nations come to agreements on international airways? What agencies supervise the agreements?
   (c) How has the growth of aviation changed the old concepts of war? peace? diplomacy?
      (1) This area could be thoroughly investigated.
   (d) Review some examples of international co-operation in aviation because of similar interests in aero-space
      (1) Safety devices
      (2) Weather information
      (3) Research facilities
      (4) Educational programs
      (5) Exchange programs (professors)

Social Effects

Objective

1. To understand some of the effects of the growth of the aviation industry on American Society.
   (a) Investigate the changes brought about by the airplane in the following areas:

      (1) Communities near airport facilities
      (2) Family travel
      (3) Education
      (4) Recreation
      (5) Crime
      (6) Employment

   (b) Project:
      (1) Student committees could investigate such contemporary problems as air pollution, noise, land use, and airport facilities.

HOME ECONOMICS AND AVIATION (as demanded)

Objectives

1. To furnish interested participants in the culinary arts in relation to aviation industry.

   NOTE: This is an added phase to this project requiring no Title III funds since the instructor is paid through State Foundation Unit monies and this course must be entirely voluntary on the student's part.

AEROSPACE TECHNOLOGY (Seniors)

Ground School

In the first semester of the third year, Kenston will offer a 1/2 course entitled Private Pilot Ground School. This will provide the student with all of the knowledge necessary to pass the Federal Aviation Administration private pilot examination. This will be given to each student at the end of the semester by F.A.A. personnel.

Also the course will relate to the subject matter covered in Aero-Space I and II. Included will be the use of the latest in audio-visual methods of teaching, including 25 filmstrips with records. This course will precede the 12-hour flight training of each student.

Objectives

1. To prepare the students for the F.A.A. examination, the passing of which is necessary for them to obtain a pilot's license.
2. To reinforce and review the principles of aviation studied in the previous two years, with particular emphasis on the practical applications soon to come in the Flight Training Course.

Content

I. Principles of Flight

II. Aircraft and engine operation

III. Aircraft performance

IV. Navigation and chart reading

V. Flight computer and plotter

VI. Radio guidance in VFR flying

VII. Radio communications

VIII. Flight information publications--airports

IX. Weather

X. Federal aviation regulations

XI. Structure of airway system

XII. Flight instruments

XIII. Altitude instrument flying

XIV. Flight planning

Field Trips

1. Cleveland Hopkins Airport
   A. Control tower
   B. Radar room
   C. Weather bureau
   D. Airport facilities
   E. Flight service station

2. Horn's Airport
3. N.A.S.A.
   A. Wind tunnels
   B. Physical plant
4. Aircraft manufacturer

Speakers

1. Meteorologist
2. Aviation consultant
3. F.A.A. representative
4. F.B.O.
5. Kent State Aero-space education representative

Projects

1. Build wind tunnel to test different types of airfoils.
2. Build airfoils.
3. Build model airplanes. Have contests to test for time in the air and distance flown.
4. Reports and term papers. The writers of best papers to be allowed to visit Wright Airlines, and stay with a professional pilot, accompanying him on a flight.

APPENDIX C

AEROSPACE SURVEY

1. Name:
2. Phone:
3. Address:

4. Course: Aerospace I II III
5. Age: 14 15 16 17 18 19
6. Sex: M F
7. Class: 10 11 12
8. Academic Status: A B C D
9. Accumulative Average
10. Class Standing:
11. Testing: Aptitude Test:

    Interest Inventory:

    Ovis--

    Strong--

12. Academic progress compared with one year ago.

13. Which course at Kenston High School do you like most?

14. Which course at Kenston High School do you like least?

15. Are you involved in extracurricular activities within the school? (List them)

16. If so, do you hold an office?

17. Are you involved in athletics? (Name them)

18. Are you involved in extracurricular activities outside of the school system? (List them)

19. If so, do you hold an office?

20. Are most of your friends here at Kenston, or at another school, or out of school?

21. Do you plan to continue your education?

22. If so, in what way?

23. Are most of your friends planning to go to college?

24. What were your main motives for taking this course?

25. What courses have your previously taken in high school that helped prepare you for this course? Do you feel they should be required?

26. Would you be interested in additional courses such as Advanced Aviation, Space Science, Aviation Mechanics, Aviation Electronics, Space Biology?

27. What is your reaction to a course that is presented mainly through Audio-Visual aids?

28. How much actual flying experience did you have at the start of the course?

29. How much actual flying time do you have now?

30. If you do not have flying time now do you contemplate any for the future?

31. Are you now working part-time in an Aviation related industry? If so, in what way?

32. Are you considering an aviation oriented career? If so, what is your main area of interest?

Airline Pilot	Aviation Mechanic
Corporate Pilot	Aviation Electronics
Military Pilot	Aviation Management
Flight Instructor	Airline Stewardess
Airforce Communications	Airline Hostess
	Other _____

33. Has this course influenced your present vocational interests?

    (a) Yes
    (b) Intensified interest in Aviation career
    (c) Created an awareness of opportunities in Aviation
    (d) Very little interest
    (e) No

34. Would you have considered an Aviation career had you not taken this course?

35. Do you plan to obtain a pilots license?

36. Do you plan to obtain a commercial license?

37. If so, what other ratings will you seek?

38. Did this course live up to your expectations? If not, what should be included?

39. Do you plan to continue in Kenston's Aerospace Programs?

40. If so, what course will you be enrolled in next year?

THE SKY'S THE LIMIT!

AT

KENSTON HIGH SCHOOL

A BRIEF EXPLANATION

OF KENSTON'S INNOVATIVE THREE-YEAR AERO-SPACE PROGRAM, MADE POSSIBLE BY A GRANT FROM FEDERAL ESEA TITLE III.

THE SKY'S THE LIMIT AT KENSTON

Kenston High School, in Geauga County, is the first high school in Ohio, and one of only five in the United States, to "take to the air" in a three-year Aero-Space Program.

Although Kenston is a relatively small school of 773 students in grades 9-12, it was one of the first schools in the country to get going in a big way in the exciting new field of aero-space education in the public schools. The initial interest was generated by Kenston Superintendent Paul T. Hill, who is an ardent aviation enthusiast and a veteran pilot with 26 years of flying experience.

Aero-Space III students receiving instruction on charting a cross-country flight.

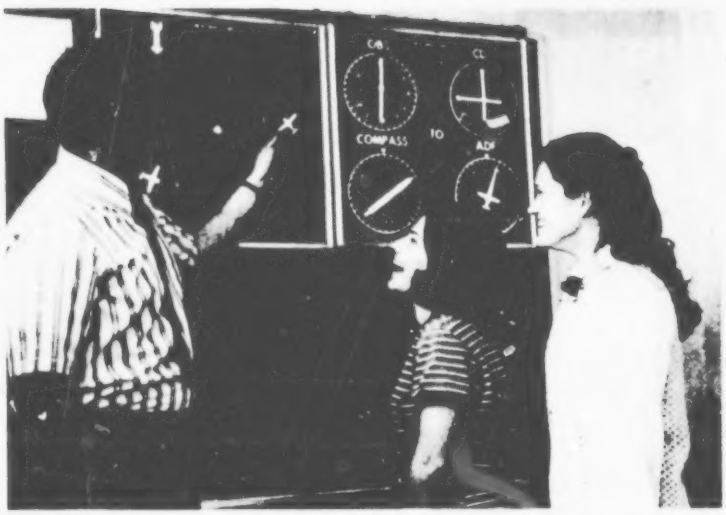
Several years of planning and consulting with experts in the field went into the development of Kenston's aviation program. Here Dr. Hill (R) and Aero-Space instructor "Skip" Smith (L) confer with Great Lakes Regional Civil Air Patrol Director Wesley Kimball.

Kenston's program began rather modestly in 1968, with a one-year course in Basic Aviation, a survey course to introduce the students to the entire aero-space field. It was and is an independent course for students who wish to take only the first course, but it also serves well as basic preparation for those wishing to go on with the second and third year courses.

In 1969 the second-year course was added to the program. Aero-Space II is divided into four nine-week units: Aero-Science, Aero-Math, Aero-Business, and Aviation in Our Culture. Each of these units is taught by a specialist in that area. The purpose of this year's work is to teach the knowledge and principles of mathematics, science, business, and social studies as they relate to aero-space.

Students and instructor working on charts in coordination with a student in the Link Simulator.

THE SKY'S THE LIMIT AT KENSTON



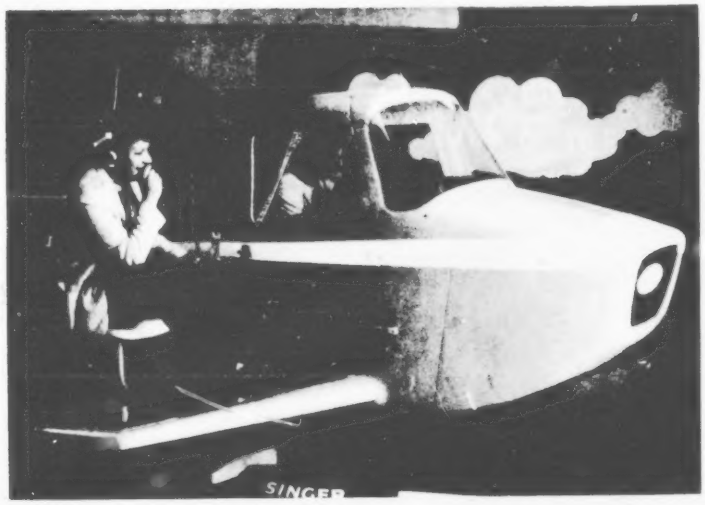
This chart is used to study instrument navigation.

This third year of Kenston's aero-space program development has been the landmark year. The school has received a grant from the ESEA Title III federal aid to education program to cover the entire cost of the program for three years. This has made possible the full implementation of the plans that have been formulating for a long time.

The third-year course, Aero-Space Technology, would have been the most difficult for Kenston to begin without financial aid, for it is the most expensive. It is the applied science of the program. This year includes advanced ground school, leading to the FAA examinations, approximately 10 hours of actual flight training, 8-10 hours of simulated flight time in a Link GAT I Trainer, and student projects in applied technology.

The aviation program has already encouraged some students to choose some aspect of aero-space as a vocational possibility. Several students are presently working at airports, in the vocational work-study program, as a result of their taking the aero-space courses. Ten of the seniors in Aero-Space III are planning to continue their education in this field. Five students who have taken aero-space now have their pilots' licenses and 10 more have soloed.

Working out a knotty problem on a flight computer.



Coming in for a landing in the flight simulator is made more realistic by the Art Department's contribution to the Aero-Space room —a wall mural of an airport and landing strip.

Much of the work in all three courses is based on actual experience and firsthand observation. The classroom is well equipped with instruments and materials used in aero-space. Navigational instruments and weather gauges are in frequent use. Many field trips are taken to local airports, the Cleveland Airport, and meteorological stations. Several local citizens, William Holihan, a commercial pilot, and Donald Hein, manager of Chagrin Falls Airport, have been especially helpful in making the courses real and meaningful.

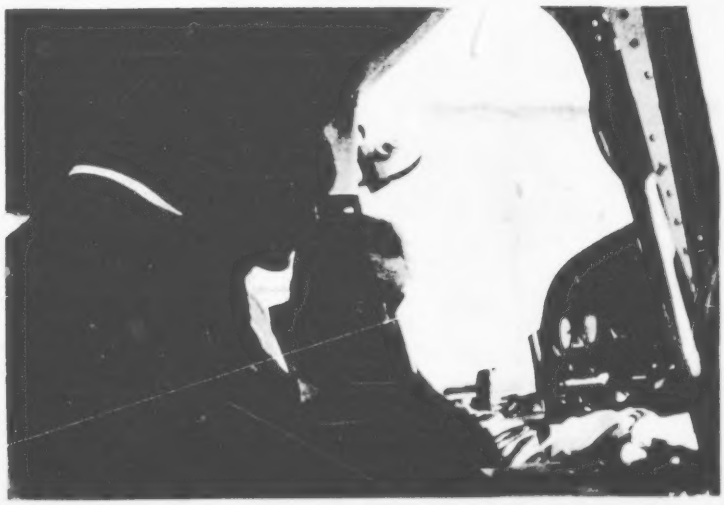
THE SKY'S THE LIMIT AT KENSTON

Aircraft and engine maintenance are important parts of the Aero-Space curriculum.

The response of the students to the new program is encouraging. In 1968, 89 students, including 10th, 11th, and 12th graders, enrolled in the one-year course. Of these, 35 went on to the Aero-Space II class. This year 43 are taking Aero-Space I, 25 are in Aero-Space II, and 33 in Aero-Space III.

An extremely valuable community resource has been Mr. Donald Hein, manager of the Chagrin Falls Airport and a licensed FAA Inspector.

Says R. G. "Skip" Smith, math teacher turned aero-space instructor (affectionately called "Sky King" by his students), "It's great to be teaching a subject in which there's so much interest — and the interest continues after school, and after they finish the course."



Mr. Hein takes several students through the pre-flight check list.

Printed and distributed by
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Courtesy of:

Dr. Paul T. Hill, Superintendent
Kenston Local Schools
17419 Snyder Road
Chagrin Falls, Ohio 44022

STUDENT
REPORT
FOLDER

OHIO VOCATIONAL INTEREST SURVEY

A MESSAGE TO STUDENTS AND PARENTS:

The Ohio Vocational Interest Survey is designed to assist students in their educational and vocational planning. The results can be used as a guide for the study of course choices or occupational fields. Although interests play an important part in educational and vocational planning, school grades, special skills or abilities, and opportunities for training and employment are among other important factors which should also be considered.

The greatest value of vocational interest measurement is that it encourages and guides the exploration of vocations. It must be remembered, however, that interests do change as students mature and have opportunities for career exploration. Students and parents should feel free to consult their school counselor, librarian, or teachers for information and assistance as they explore possible career fields.

This Report Folder contains information about measured vocational interests and expressed plans. To interpret these interests and plans, first read the descriptions of the 24 Interest Scales which appear on page 4. The scores on the 24 scales are reported in the Profile Chart on page 2. A better understanding of vocational and educational plans can be gained by considering these scores together with the information contained in the Student Questionnaire section. The directions on page 3 will help you to read and understand the Profile Chart.

Ohio Testing Services

Division of Guidance and Testing · State Department of Education
751 Northwest Boulevard · Columbus, Ohio 43212

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OVIS PROFILE CHART

Date 12/ 3/70 Age 16 Sex F

Reference Group GRADE 11 FEMALE

Scale Number	Scale Name	Scale Score	% ile Rank	Stanine Profile (Low 1 2 3 / Average 4 5 6 / High 7 8 9)	Scale Clarity Index
21	MUSIC	52	97	9	H
19	ARTISTIC	44	85	7	H
11	TRAINING	43	94	8	F
8	CUSTOMER SERVICE	41	81	7	F
23	TEACH-COUN-SOC W	38	70	6	I
4	CARE PEOPLE-ANIM	37	54	5	F
15	AGRICULTURE	33	89	8	I
18	MANAGEMENT	31	72	6	I
22	ENTERTAINMENT	30	54	5	I
20	SALES REPRESENT	28	71	6	F
3	PERSONAL SERVICE	27	60	6	F
12	LITERARY	27	44	5	F
17	PROMOTION-COMMU	26	37	4	I
16	APPLIED TECH	24	70	6	F
10	SKILLED PER SERV	24	28	4	F
7	CRAFTS	21	68	6	H
14	APPRAISAL	20	46	5	H
6	INSPECT-TESTING	20	42	5	H
5	CLERICAL WORK	20	12	3	H
2	MACHINE WORK	19	75	6	H
13	NUMERICAL	19	35	4	H
24	MEDICAL	18	24	4	H
1	MANUAL WORK	15	37	4	H
9	NURSING	15	3	1	H

*Too many questions omitted for a score to be reported.

Name DOE, MARY

School KENSTON

Grade 11 Group 2

Student Questionnaire Information

A. Occupational Plans

First CUSTOMER SERVICE

Second TEACH-COUN-SOC W

B. Best Liked Subjects

First FOREIGN LANGUAGES

Second ART

C. High School Program

COLLEGE PREP.

D. Post-High School Plans

COLLEGE-UNIVERSITY

E. Interest in Vocational Programs

INTERESTED

F. Vocational Program Choice

First COMMERCIAL ART

Second PRINTING-DUPLICATING

Local Survey Information

G	H	I	J

K	L	M	N

DIRECTIONS

How To Read Your Profile Chart

The Profile Chart on page 2 is a graphic picture of your interests in the 24 general work areas covered by the OVIS Interest Scales. Look at your **Scale Scores** in the third column of the Profile Chart. Note that these scores are ranked from high to low. It is possible to get a score as high as 55 or as low as 11. An asterisk (*) indicates that you omitted too many questions to obtain a score on that scale. The scores show you the relative strengths of your interests in the job activities described in OVIS. In other words, you have shown more interest in the job activities that make up the scales at the top of the list than you have in the job activities that make up the scales at the lower end of the list.

Now look at the **Percentile Ranks** (%ile Ranks) in the next column. These scores show you how your interests compare with those of other students in your reference group. For example, if you had a percentile rank of 56 on the *Manual Scale (Scale 1)*, this would mean that you have shown more interest in manual activities than have 56 percent of the students in your group. The reference group to which you are being compared appears at the top of page 2.

The **Stanines** in the Profile Chart are based on a STAndard NINE-point scale ranging from 1 (low) to 9 (high). Like the percentile ranks, stanines show how your interest scores compare with those of your reference group. Stanine scores of 1, 2, and 3 represent low interest; 4, 5, and 6, average interest; and 7, 8, and 9, high interest.

Look at the overall pattern of high and low stanines. Are there noticeable differences in your stanine scores from scale to scale? Consider only stanine differences of two or more points as being important.

The **Scale Clarity Indexes** reported in the Profile Chart show how consistent you were in responding to the activities in each scale. A Scale Clarity Index of "H" means that you were *highly consistent* in the way in which you marked your answers to the statements which make up the scale. That is, you marked most of your answers with the same degree of "like" or "dislike." A Scale Clarity Index of "F" means that you were *fairly consistent* in the way in which you marked your answers. A Scale Clarity Index of "I" means that you were *inconsistent* in the way in which you marked your answers; you may have liked some of the job activities but disliked others.

You may wish to explore further the occupations covered by any scale for which you have a Scale Clarity Index of "I." It is quite possible that you may have a strong interest in one or more jobs covered by a scale and little interest in the other jobs described by that scale.

Your answers to the *Student Questionnaire* are reported below your name block. Look at **1. Occupational Plans.** Listed there are the two job areas which you chose as best representing the types of work you would like to do for a living. How do your scores on the 24 interest scales compare with your job choices and with the other information from the questionnaire?

Your interests should play an important part in your educational and vocational planning, but you should also consider school grades, special abilities, and other important information. You will want to investigate further the specific occupations that make up the scales in which you have shown the greatest interest. Your counselor has additional information about each of the OVIS scales to help you as you explore these occupations.

The 24 Interest Scales are briefly described below. The three-digit numbers following the scale titles represent the levels of involvement with Data, People, and Things (in that sequence) of typical jobs belonging to each scale. Low involvement is represented by 0, average by 1, and high by 2. Further explanation and expanded scale descriptions are reported in the OVIS Interpretive Manual.

1. **Manual Work** (001)–Unskilled use of tools and routine work done by hand. Includes construction worker, farm hand, firefighter, dishwasher, janitor, and furniture mover.
2. **Machine Work** (002)–Operating and adjusting machines used in processing or manufacturing. Also includes driving tractor-trailer trucks and operating heavy equipment.
3. **Personal Services** (010)–Providing routine services for people as a waiter, waitress, household worker, doorman, messenger, gas station attendant, train conductor, policeman, fashion model, steward, or stewardess.
4. **Caring for People or Animals** (011)–Routine work related to the day-to-day needs of people or animals. Includes working in a nursing home, nursery, hospital, pet store, zoo, or animal laboratory.
5. **Clerical Work** (100)–Typing, recording, filing, and other clerical or stenographic work.
6. **Inspecting and Testing** (101)–Sorting, measuring, or checking products and materials; inspecting equipment or public facilities.
7. **Crafts and Precise Operations** (102)–Skilled use of tools or other equipment as in the building trades, machine installation and repair, or the operation of trains, planes, and ships. Includes carpenter, welder, tool and die maker, watch repairman, television technician, mechanic, and appliance repairman.
8. **Customer Services** (110)–Waiting on customers in stores, banks, motels, offices, or at home; helping telephone customers with business orders, reservations, and other information. Also includes tour guides, bus drivers, and ticket and toll collectors.
9. **Nursing and Related Technical Services** (111)–Providing services as a nurse, physical therapist, X-ray or medical laboratory technician, or dental hygienist.
10. **Skilled Personal Services** (112)–Providing skilled services to people such as tailoring, cooking, barbering, or hairdressing.
11. **Training** (120)–Instructing people in employment or leisure-time activities such as games, crafts, flying, driving, and machine operation. Also includes training dogs, horses, and other animals.
12. **Literary** (200)–Writing novels, poetry, reviews, speeches, or technical reports; editing; translating.
13. **Numerical** (200)–Using mathematics as in accounting, finance, data processing, or statistics.
14. **Appraisal** (201)–Determining the efficiency of industrial plants and businesses, evaluating real estate, surveying land, and chemical or other laboratory testing.
15. **Agriculture** (202)–Farming, forestry, landscaping, and plant or animal research.
16. **Applied Technology** (202)–Applying engineering principles and scientific knowledge. Includes physics, chemistry, geology, architecture, and mechanical or other types of engineering.
17. **Promotion and Communication** (210)–Advertising, publicity, radio announcing, journalism, news information service, interviewing, recruiting; also providing legal services as a judge or lawyer.
18. **Management and Supervision** (210)–Administrative or supervisory work, such as shop foreman, supervisor, school administrator, police or fire chief, head librarian, executive, hotel manager, and union official. Includes owning or managing a store or business.
19. **Artistic** (212)–Interior decoration, display work, photography, commercial and creative art work, and artistic restoration.
20. **Sales Representative** (212)–Demonstrating and providing technical explanations of products or services to customers; selling products or services and providing related technical assistance. Includes department store buyer, factory sales representative, wholesaler, and insurance or real estate salesman.
21. **Music** (220)–Composing, arranging, conducting, singing, or playing instruments.
22. **Entertainment and Performing Arts** (220)–Entertaining others by participating in dramatics, dancing, comedy routines, or acrobatics.
23. **Teaching, Counseling, and Social Work** (220)–Providing instruction or other services in a school, college, church, clinic, or welfare agency. Includes instruction in art, music, ballet, or athletics.
24. **Medical** (222)–Providing dental, medical, surgical, or related services for the treatment of people or animals.

DOE, JOHN M 06-25-71 479 030093 -

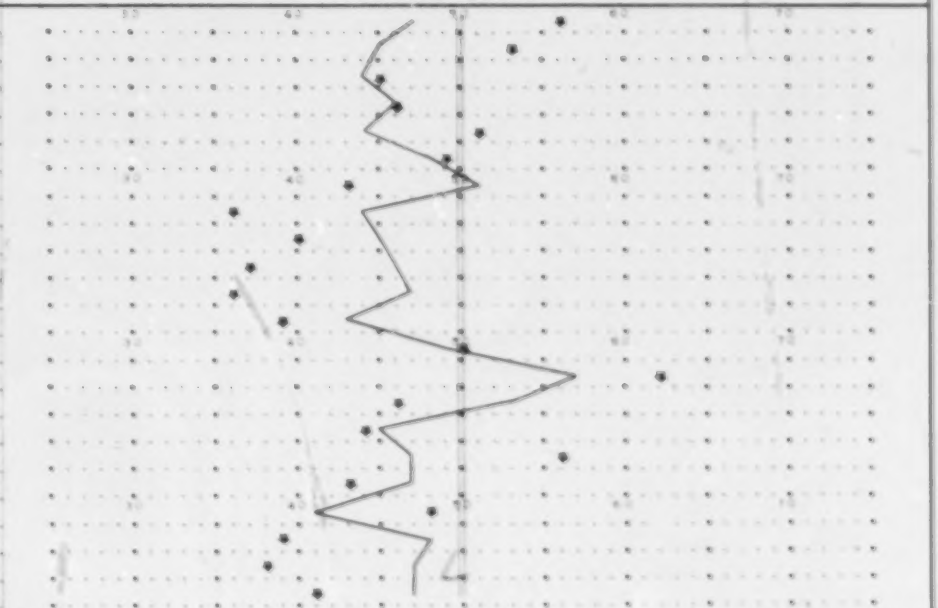
APPENDIX F FORM T399

NCS PROFILE — STRONG VOCATIONAL INTEREST BLANK — FOR MEN

BASIC INTEREST SCALES

SCALE	STD. SCORE
PUBLIC SPEAKING	56
LAW POLITICS	53
BUSINESS MANAGEMENT	45
SALES	46
MERCHANDISING	51
OFFICE PRACTICES	49
MILITARY ACTIVITIES	43
TECHNICAL SUPERVISION	36
MATHEMATICS	40
SCIENCE	37
MECHANICAL	36
NATURE	39
AGRICULTURE	50
ADVENTURE	62
RECREATIONAL LEADERSHIP	46
MEDICAL SERVICE	44
SOCIAL SERVICE	56
RELIGIOUS ACTIVITIES	43
TEACHING	48
MUSIC	39
ART	38
WRITING	41

PLOTTED SCORE



DOUBLE LINE: AVERAGE SCORE FOR 850 22 YEAR OLD MEN. SINGLE LINE: AVERAGE SCORE FOR SAME MEN WHEN 18 YEARS OLD.

OCCUPATIONAL SCALES

	OCCUPATION	STD. SCORE
I	DENTIST	30
	OSTEOPATH	22
	VETERINARIAN	29
	PHYSICIAN	27
	PSYCHIATRIST	13
	PSYCHOLOGIST	27
	BIOLOGIST	20
II	ARCHITECT	23
	MATHEMATICIAN	17
	PHYSICIST	5
	CHEMIST	18
	ENGINEER	11
III	PRODUCTION MANAGER	24
	ARMY OFFICER	12
	AIR FORCE OFFICER	19
IV	CARPENTER	19
	FOREST SERVICE MAN	11
	FARMER	38
	MATH-SCIENCE TEACHER	26
	PRINTER	35
	POLICEMAN	19
V	PERSONNEL DIRECTOR	15
	PUBLIC ADMINISTRATOR	26
	REHABILITATION COUNS.	23
	YMCA STAFF MEMBER	40
	SOCIAL WORKER	29
	SOCIAL SCIENCE TEACHER	46
	SCHOOL SUPERINTENDENT	23
	MINISTER	14
VI	LIBRARIAN	31
	ARTIST	28
	MUSICIAN PERFORMER	34
	MUSIC TEACHER	33
VII	C.P.A. OWNER	11
VIII	SENIOR C.P.A.	20
	ACCOUNTANT	20
	OFFICE WORKER	28
	PURCHASING AGENT	33
	BANKER	28
	PHARMACIST	26
	FUNERAL DIRECTOR	32
IX	SALES MANAGER	23
	REAL ESTATE SALESMAN	40
	LIFE INS. SALESMAN	30
X	ADVERTISING MAN	35
	LAWYER	36
	AUTHOR-JOURNALIST	33
XI	PRESIDENT-GEN.	13

SUPP. OCCUPATIONAL SCALES

	STD. SCORE
CREDIT MANAGER	23
CHAMBER OF COMMERCE EXEC.	41
PHYSICAL THERAPIST	21
COMMERCIAL PROGRAMMER	29
BUSINESS TEACHER	29
COMMUNITY RECREATION	37

NON-OCCUPATIONAL SCALES

AACH	AR	DIV	MFH	MO	DIE	DL	EL
38	30	44	69	32	48	50	34

ADMINISTRATIVE INDICES

739	5	5	0	50	34
TR	CNP	FI	LP	IR	OR

SCORED BY NATIONAL COMPUTER SYSTEMS, INC. EDITED BY NCS PROFILE PROGRAM

A GUIDE FOR UNDERSTANDING YOUR RESULTS

On the reverse side of this sheet are your scores from the Strong Vocational Interest Blank. These scores can tell you something about your vocational interests, but THEY DO NOT TELL YOU ANYTHING ABOUT YOUR ABILITIES—those have to be determined by other means. This point needs to be continually emphasized. These results are concerned with what you like to do, not with what you are capable of doing. Both types of information need to be considered in making future plans. Four types of scores are reported on the profile sheet on the reverse side; each is discussed below.

THE BASIC INTEREST SCALES These scales are concerned with specified types of activities, such as Sales, Science, or Business Management. Your scores are printed after the scale names and are plotted visually in the right hand portion of the sheet. For a comparison group, a sample of 52-year old men has been used here; their average scores have been set equal to 50 on each scale, represented by the broad vertical line at 50. The narrow, jagged line in the middle of the profile represents the average scores for these same men when they were 16 years old. Thus, you can compare your scores with both teenage and adult males.

Men in relevant occupations usually average 58 or above on the relevant scale; that is, scientists score 58+ on the Science scale, artists 58+ on the Art scale, and so on. Therefore, scores over 58 are considered "high" and, analogously, scores below 42 are "low."

THE OCCUPATIONAL SCALES Each of these scales represents the vocational interests of men in the designated occupation, and your score tells you how your interests compare with them. On these scales, the men in the occupation average 50, and more than 67% score between 40 and 60. For example, most dentists score about 50 on the DENTIST scale—two-thirds of them score between 40 and 60. If your score is 50 or above on the DENTIST scale, you have many likes and dislikes similar to dentists.

The shaded area on each scale shows you the scores for the middle third of a sample of "men-in-general" drawn from diverse occupations—another third of this group scored higher, another third lower.

NON-OCCUPATIONAL SCALES and **ADMINISTRATIVE INDICES** These scales are for use only by professionally trained counselors; they are discussed at length in the Handbook for the SVIB, published by Stanford University Press.

SOME FREQUENTLY ASKED QUESTIONS ABOUT THE SVIB SCORES

1. Do these results tell me what I would be good at?

Positively not! These results can tell you something about the directions of your interests, and how they compare with successfully employed men. However, the scores are more related to what you like to do than what you can do. Although people generally like to do what they can do best, there are many exceptions to that, and these results definitely are not measures of ability.

2. Then how should I use this information?

In planning your future, you will want to find a career where you can find both success and satisfaction. Achieving success depends more on your abilities, while satisfaction is related to your interests. The results reported here can suggest occupational areas where you have similar likes and dislikes with the men employed there, and where you are likely to find the work interesting and satisfying.

You must also recognize that choosing an occupation is not a single decision—throughout your working life, you will need to make a series of choices. Each time you are faced with a decision, you should seek the best possible information about yourself, and about your alternatives. This inventory can help by providing some systematic information about occupations you might enjoy.

3. These results don't really tell me anything that I didn't already know, do they?

Perhaps not, but that depends. While most people know something of their own interests, few know how they compare with men in other occupations. Your scores give you some information about these comparisons, and may suggest possibilities that you had never considered before.

4. Wouldn't my scores change considerably if I filled in the test again—when I was in a different mood?

Probably not. In several research projects, people have been asked to fill in this test twice, or more, over intervals ranging from 2 weeks to forty years. Although there are always exceptions, most profiles—especially those for adults—are surprisingly stable. After age 25, very few people show any large shifts. Teenagers retested after two or three years do show some changes, though they are seldom extreme.

5. Is this test 100% accurate?

Of course not. Each individual is unique—and no test can reflect all of the diversity between human beings. These results, combined with other information, can be used as suggested guidelines, nothing more. If at all possible, you should discuss your plans with a professionally trained counselor.

For more information on this inventory, consult The Handbook for the Strong Vocational Interest Blank, Stanford University Press.

David P. Campbell, Director
Center for Interest Measurement Research
University of Minnesota
Minneapolis, Minnesota 55455

GENERAL APTITUDE TEST BATTERY - B10028 -

OHIO TESTING SERVICES - DIVISION OF GUIDANCE & TESTING

STUDENT NAME: DOE, MARY

SCHOOL: KENSTON
SYSTEM: KENSTON
AGE: 15 YRS. 03 MOS.
SEX: F
GRADE: 9
NORM: GRADE 9
TEST DATE: 11/11/71
TEST GROUP: 00

TEST PERFORMANCE RECORD

TEST PART:	1	2	3	4	5	6	7	8	9	10	11	12
RAW SCORE:	56	25	23	19	36	7	26	67	86	102	31	33
ACC INDEX:	.91	.83	.65	.54	.87	.43	.74					

APTITUDE:	G	V	N	S	P	Q	K	F	M
STANINE:	5	6	5	7	7	7	6	7	5
DOT RANGE:	3-3	3-2	3-3	2-1	2-1	2-1	3-2	2-1	4-2

OCCUPATIONAL INFORMATION REPORT

LISTING OF WORKER TRAIT GROUPS WITH APTITUDE RANGES RELATING TO TEST PERFORMANCE

INFO CODE	WORKER TRAIT GROUP TITLE	OVIS SCALE	DOT PAGE
5	ART-RESTORATION	19	234
16	INFO MANAGEMENT	08	258
24	CLASSIFY/FILING	05	276
25	STENOGRAPHY	05	278
33	CRAFTS-FOREMAN	18	299
37	CRAFTSMANSHIP	07	312
38	PRECISION WORK	02	319
43	FLIGHT TRAINING	11	339
46	INSTRUCTION-MISC	11	345
49	ANIMAL TRAINING	11	351
57	TECHNICAL WORK	16	379
62	ENTERTAINER	22	390
68	PERFORMING	22	402
71	MODELING	03	408
73	FARMING-TECHNICAL	06	413
74	INSPECT/PROTECT	17	416
92	NURSE/MED TECH	09	477
101	BEAUTICIAN/BARBER	10	499
104	ACCOMMODATING	03	505
106	MESSENGER/USHER	03	509

LISTING OF WORKER TRAIT GROUPS WITH APTITUDE RANGES THAT ARE LOWER THAN TEST PERFORMANCE

INFO CODE	WORKER TRAIT GROUP TITLE	OVIS SCALE	DOT PAGE
8	BUSINESS TRAINING	11	241
19	ALLOCATE/EXPEDITE	08	265
21	CASHIERING	08	269
22	INSPECTING	06	271
23	BUS MACH OPERATOR	07	274
26	COMPUTING CLERK	05	280
27	CLERICAL SORTING	06	282
28	CLERICAL TYPING	05	287
29	CLERICAL CHECKING	05	289
30	SWITCHBOARD	08	291
34	CRAFTS-SUPERVISOR	18	305
35	TAILORING	10	308
36	COOKING	10	310
39	MANIPULATING	01	322
41	INDUSTRIAL TNG	11	335
50	SIGNALING	03	354
51	MACHINE FEEDING	01	356
52	HANDLING	01	360
64	MUSIC-INSTRUMENT	21	394
69	AMUSEMENT	22	404
70	SPECIAL ENTERTAIN	22	406
72	FARM-PLANT/ANIMAL	15	411
77	PILOTING/DRIVING	07	422
79	GUARD/PROTECT	03	427
80	MACHINE TRADES	07	430
81	MACHINE-SET UP	02	433
82	MACHINE-CONTROL	02	435
83	EQUIPMENT DRIVER	02	444
84	MACHINE TENDING	01	447
85	SUPERVISE SERVICE	18	461
93	CHILD-ADULT CARE	04	479
96	SALES/SERVICE	20	486
97	DEMONST/SALES	8+20	488
98	DELIVERY/SERVICE	08	491
99	SALES-SPECIALIZED	03	493
102	CUSTOMER SERVICE	08	501
103	SERVICE/MISC	03	503
105	PERSONAL SERVICE	03	507
107	ANIMAL CARE	04	511
108	PHOTO MACH WORK	07	514
110	PUBLIC TRANSPORT	08	519

LISTING OF WORKER TRAIT GROUPS WITH APTITUDE RANGES THAT EXCEED TEST PERFORMANCE

INFO CODE	WORKER TRAIT GROUP TITLE	OVIS SCALE	DOT PAGE
1	ARTS INSTRUCTIVE	23	226
2	ART-DECORATING	19	228
3	PHOTOGRAPHY	19	230
4	CREATIVE ART	19	232
6	BUS ADMIN	18	237
7	BUS NEGOTIATING	17	239
9	BUS SUPERVISORY	18	243
10	BUS MANAGEMENT	18	245
11	BUS CONSULTING	18	248
12	INTERVIEWING	17	250
13	ACCOUNTING	13	252
14	LEGAL DOCUMENTING	12	254
15	CORRESPONDING	12	256
17	SCHEDULE/DISPATCH	18	261
18	SECRETARIAL	17	263
20	PAYING/RECEIVING	08	267
31	BEHAVIOR SCIENCE	12	294
32	COUNSELING	23	296
40	NURSE-SUPERVISOR	23	333
42	VOCATIONAL EDUC	23	337
44	H.S./COLL TEACH	23	341
45	ELEMENTARY EDUC	23	343
47	PHYSICAL EDUC	23	347
48	SUPERVISORY TNG	11	349
53	ENGINEER/DESIGN	16	371
54	SALES-ENGINEERING	20	373
55	PRODUCTION MANAGE	18	375
56	DRAFTING	16	377
58	ENGINEER	14	381
59	IND ENGINEER	14	383
60	SURVEYING	14	385
61	TECHNICAL WRITING	12	387
63	DRAMATICS	22	392
65	MUSIC-VOCAL	21	396
66	MUSIC-RHYTHMICS	22	398
67	ANNOUNCING RAD/TV	17	400
75	LABORATORY WORK	14	418
76	APPRAISE/INSPECT	14	420
78	LEGAL WORK	17	425
86	HEALTH PHYSICS	24	464
87	SCIENTIST	15+16	466
88	MATH/SCIENCE	13	468
89	SURGERY	24	471
90	MEDICAL	24	473
91	THERAPY	24	475
94	PUBLIC RELATIONS	17	482
95	PURCHASING/SALES	20	484
100	CREATIVE MUSIC	21	496
109	TECH WORK-RADIO/TV	07	516
111	JOURNALISM	17	522
112	CREATIVE WRITING	12	524
113	NEWS REPORTING	17	526
114	TRANSLATE/EDIT	12	528

APPENDIX H

A. STATISTICAL INFORMATION

Project Name: Aviation Education

Project Number: 45-69-059

Applicant Agency: Kenston Local School District
17419 Snyder Road
Chagrin Falls, Ohio 44022

Project Grant Period: Beginning-June 1, 1970

Termination-May 31, 1973

Amount of Each Grant:

Beginning Date	Ending Date	Amount
June 1, 1970	To May 31, 1971	$ 56,860
June 1, 1971	To May 31, 1972	35,000
June 1, 1972	To May 31, 1973	42,000
	Total	$133,860

B. ACTIVITIES AND OBJECTIVES

Primary Objective: Provide a marketable skill for the non-college bound high school graduate in this fast-expanding field of employment as well as in the information concerning colleges and technical institutes in aviation education.

To apply the skills of math, geography, cartography, science, etc. under real job training conditions.

Specific Objectives and Activities:

Object 1A: To Develop a Three-year Vocationally-oriented Aerospace Program.

Kenston High School has developed a three-year sequential vocationally-oriented Aerospace course. A brief course description follows:

The entire three-year program in Aerospace Education will include three year-long courses, totaling three units of high school credit. This program is available to 10th, 11th, and 12th grade students.

Aerospace 1 is a basic or survey course to introduce and orient the student to the entire aerospace field. It should serve as an independent course for the student taking only this course, as well as the basic course for the student taking the entire three-year program. An orientation flight in both the Link Trainer and also a Cessna Sky Hawk is part of this course.

Aerospace 11 will be divided into four nine-weeks units, Aero-Science, Aero-Mad., Aero-Business, and Aviation in Our Culture. Each unit will be taught by a specialist in that area. The overall purpose of this year's work will be to teach and apply the knowledge and principles of each of these disciplines as they relate to aerospace. An orientation flight in a glider and a biplane is part of this course.

Aerospace 111 Aerospace Technology will be the Applied Science of the series. It will consist of advanced ground school, leading to the FAA exam, and a semester of flight training (approximately 8 hours actual flight time) as a partial requirement for a pilot's license. Students will also be scheduled for approximately 8-10 hours of simulated flight time in the Line GAT 1 Trainer. It is planned that the D.C.T. and C.O.E. programs be coordinated with this course, permitting students to work in related jobs.

The entire Aerospace Program will be supplemented with speakers, audio visuals and field trips. Students in each course will also be required to do an independent study project.

Object 1B: Emphasis on individual study will be required of Aerospace 11 students.

Individual study was emphasized in Aerospace 11 with students working on some projects related to Aviation or Space. Written reports on their topics are kept in a file for those students or interested parties who would wish to preview them. Individual study projects have been expanded and

are also required of Aerospace 1 and 111 students.

Objective 1C: Some Aerospace 111 Students will participate in Vocationally-oriented programs such as D. C. T. and C. O. E.

Several Aviation students each year are chosen to work at Chagrin Falls Airport on a work study basis.

Objective 11: To employ the talents of five departments to relate their disciplines to Aerospace.

Teachers from five departments have been utilized to instruct the Aerospace 11 segment. The departments include Aerospace Math, Science, Business and Social Studies. The teachers instruct the students in these special areas as they relate to Aviation and Space.

Objective 111: To develop a detailed three-year program in the format for sophomores, juniors, and seniors.

The above is on file at this institution and at Title 111 office.

Objective 1V: To make a course of study available to all interested parties.

There is a continuous effort on this institution's behalf to make available to all interested parties any information that might be helpful to them.

Objective V: Participants will show at end of each year in Aerospace 1, 11, 111:

(1) A change in increase by 10% improvement in attendance and punctuality.

(2) A reduced drop rate of 50%.

(3) A change in personal interest directed towards the aviation field.

(4) A better attitude toward a choice in aviation as their chosen vocation based on free choice after exposure to what is possible.

C. CONTINUATION EFFORTS

Primary Objective: (that of providing a marketable skill for the non-college bound high school graduates as well as providing information concerning colleges and technical institutes in aviation,) will be re-organized and possibly expanded.

It is our intention to continue Aerospace 1 and Aerospace 111 as outlined in Objective 1A previously mentioned. The material covered in Aerospace 11 (science, math, business, social studies) can be assimilated into Aerospace 1 and Aerospace 111.

Plans are in the making to initiate a program on the Career Education Level. This is tentative and will depend on the approval of the State Department of Education. The course planned is Avionics (Aviation Radio Electronics) ; see appendix A (Avionics) for course syllabus.

The course will be a two-year course aimed at preparing the students for immediate employment upon graduation.

This agency (Kenston High School) will be responsible for continuing the program as written in the original proposal with the exception of Aerospace 11. This course will be assimilated into Aerospace 1 and 111. In order to institute the two-year vocational course, we must have assistance from the State Department of Education. The following is a cost data sheet of expenses projected for the 1973-74 school year and who the responsible agent will be.

100

ACCOUNT NO.	CLASS	ITEM	CONTINUE	TIME	AMOUNT	RESPONSIBLE AGENT	CONTINUED AMOUNT
100	Professional Salaries	Volkavich's Project DIR	No	1/4	4150	--	-0-
100	Non Professional	Project Secretary	No	1/4	1750	--	-0-
100	Non Professional	Nichols, D-Clerk	No	1/20	750	--	-0-
100	Contracted Services	16 mm Movie	No	--	2000	--	-0-
100	Travel	Travel	No	--	300	--	-0-
TOTALS					8950		-0-

ACCOUNT NO.	CLASS	ITEM	CONTINUE	TIME	AMOUNT	RESPONSIBLE AGENT	CONTINUED AMOUNT
200	**Professional Salaries**	**Smith, S. G. Aerospace 1, 11**	**Yes**	**1**	**11,880**	**KHS**	**11,880**
200	Professional Salaries	Aviation 11, Instructor Science	No	1/4	1,080	--	-0-
200	Professional Salaries	Aviation 11, Instructor Math	No	1/4	1,080	--	-0-
200	Professional Salaries	Aviation 11, Instructor Business	No	1/4	1,080	--	-0-
200	Professional Salaries	Aviation 11, Instructor Social Studies	No	1/4	1,080	--	-0-
200	Contracted Services	Hein Horn Flying School	No		8,000	--	-0-
200	Materials & Supplies	Library Books, Magazines	No		2,983	--	-0-
200	Travel	Travel	No		700	--	-0-
TOTALS					27,883		11,880

ACCOUNT NO.	CLASS	ITEM	CONTINUE	TIME	AMOUNT	RESPONSIBLE AGENT	CONTINUED AMOUNT
500	Pupil Transportation Non Professional Salaries	Bus Driver	No		500	--	-0-
TOTALS					$500		-0-
700	Maintenance of Plant	Link GAT 1 Service agreement	Yes		1200	KHS	1200
TOTALS					1200		1200
800	Fixed Charges	Professional	Yes		2250	KHS	2250
800	Fixed Charges	Non-Professional	No		342	--	-0-
TOTALS							2250

D. PHASES TO BE DISCONTINUED

Aerospace II will be discontinued in its entirety. It is this agency's belief that the material taught in this course can easily be incorporated into Aerospace I and III. The primary reason for discontinuance is to make room for our proposed two year program in Vocational Avionics. Other reasons for discontinuance are costs and instructor scheduling.

There will be no attempt to continue this project activity (Aerospace II) after termination of project support.

APPENDIX A
Avionics Curriculum

This appendix lists the subjects required in electronic fundamentals, aircraft systems, and Federal Aviation Regulations, and Federal Communications Commissions Rules. The number following each block title indicates a representative number of hours in the course subjects shown under that block title. The order of listing is not indicative of the order in which subjects should be taught. Instead they are only subjects which should be considered in the course curriculum.

Block 1. Electronic Fundametals - 900 hrs.

A. Basic Electricity.

Ohm's law, voltage, current, resistance.

Impedance, capacitance, inductance, reactance, series and parallel circuits, network theorems.

Electrical power generation and transformation, magnetism, motor principles, and wave shape.

AC and DC measuring instruments.

Laboratory work should include use of hand tools, meters, oscilloscopes, practical experiments in basic electrical circuits, soldering, aviation wiring practices, and installation procedures.

B. Electronic Theory.

Basic electron theory.

Vacuum tube theory and application.

Circuits including power supplies, RF, IF, and AF amplifiers, detectors, ocillators, AVC, convertors, and limiters.

Basic solid state theory, multibrators, control amplifiers, logic gates, and other circuitry commonly used.

Laboratory work should include practical experience in constructing and analyzing various types of radio stages, including the test adjustment and calibration of various circuits using typical items of avionics test equipment.

C. Technicial Mathematics.

Basic arithmetic with algebraic notations, equations, factoring, fractions, exponents, powers, roots, and graphs.

Algebra, formulas, and applications, positive and negative numbers, vector diagrams.

Trigonometry and slide rule.

D. Graphics.

Drafting fundamentals, blueprints, and wiring diagrams.

Symbols commonly used in aircraft electrical, electronic, and logic circuit diagrams.

E. Introduction to Computers.

Computer fundamentals, digital and analog, binary number system, Boolean algebra, counting and switching circuits, gates, storage systems.

Laboratory work should include practical experience in analysis and experiments with computer circuits commonly used in aircraft electronic systems, and the functions they perform.

Block 11. Aircraft Systems - 1200 hrs.

A. Electrical Power.

Generation and distribution systems. Batteries and battery charging systems. AC and DC generators, motors, starter-generator combinations.

Protective devices, warning systems, load transfer, and fault clearing.

Airborne auxiliary power units. Ground power units.

Laboratory work should include load analysis, troubleshooting, and repair, experiments in load distribution, protective devices and limiters, and use of manufacturers' maintenance manuals and publications.

B. Communications.

VHF transmitters, receivers, and transceiver circuits.
HF transmitters, receiver, transceiver circuits, and single-sideband principles.
Emergency locator transmitters including UHF circuits.

Passenger address and crew intercom systems.

Antenna types and wave propagation, transmission lines.

Laboratory work should include study and operation of equipment, troubleshooting, and repair, use of specialized test equipment, and manufacturers' maintenance manuals and publications.

C. Navigation.

LF and Mf navigation receivers; Decca, ADF, Loran, Consol, etc.

VHF navigation receivers, VOR. Instrument landing system receivers; glide slope, localizer marker.

Magnetic compass system, directional gyros, principles of gyros.

Laboratory work should include study and operation of the equipment, troubleshooting use of specialized test equipment, and manufacturers' maintenance manuals and publications.

D. Pulse and Microwave.

Weather radar, antennas, waveguides, transmit-receive units. Doppler radar systems.

Radio and radar altimeter.

Distance measuring equipment, ATC transponder.

Laboratory work should include study and operation of the equipment, troubleshooting,use of specialized test equipment and manufacturers' maintenance manuals and publications.

E. Flight Control Systems.

Synchros, servomechanisms, resolvers.

Attitude and rate gyros.

Automatic pilots, yaw damper, automatic trim stabilizers.

Automatic stabilization systems for small aircraft.

Integrated flight systems.

Laboratory work should include study and operation of the equipment, troubleshooting, use of specialized test equipment, and manufacturers' maintenance manuals and publications.

Block III. Regulatory Requirements - 100 hrs.

A. Federal Aviation Regulations (FAR).

FAR 1, Definitions and Abbreviations.

FAR 43, Maintenance, Preventative Maintenance, Rebuilding and Alteration.

FAR 65, Certification; Airmen Other than Flight Crewmembers.

FAR 91, General Operating and Flight Rules.

FAR 145, Repair Stations.

Other related FARs and Advisory Circulars.

B. Federal Communications Commission Regulations.

Personnel (operator) licenses.

Aircraft station licesnses.

Aeronautical ground station licenses.

E. EQUIPMENT INVENTORY

ITEMS	P.O. NO.	PRICE	LOCATION
Sound Projector	70-1506	$ 495.00	208
Squibb-Taylor Opaque Projector	70-1506	320.00	208
Link GAT I Trainer	70-1918	17,110.00	208
Sound Projector Dukane Filmstrip	71-170	305.00	208
Transpaque Overhead Projector	71-170	450.00	208
Model D Executive Typewriter	71-1182	395.00	Mr. Volkavich's office
Mathematics Series Slides & Carousel Slide Projector-Kodak	71-1298	450.00	116

F. EQUIPMENT NOT REQUIRED FOR PHASE-IN

All equipment will be used in the Phase-In Program. Its use will be incorporated in the proposed program.